

**DECISION RECORD**  
**Devon Energy Production Company, L.P., Cottonwood 1 Plan of Development (POD)**  
**Environmental Assessment (EA), WY-070-EA12-102**  
**Bureau of Land Management, Buffalo Field Office, Wyoming**

**DECISION.** BLM approves the Devon Energy Production Company, L.P. (DEP) Cottonwood 1POD oil and gas well applications for permit to drill (APDs) described in Alternative B of the EA WY-070- EA12-102. This approval includes the wells' associated infrastructure, including 2 fresh water storage pits.

**Compliance.** This decision complies with:

- Federal Land Policy and Management Act of 1976 (FLPMA) (43 USC 1701) and DOI Order 3310.
- Mineral Leasing Act of 1920 (MLA) (30 U.S.C. 181); to include On Shore Order No. 1.
- National Environmental Policy Act of 1969 (NEPA) (42 USC 4321).
- Buffalo Resource Management Plan (RMP) 1985, Amendments 2001, 2003, 2011.

BLM summarizes the details of the approval of Alternative B, below. The EA includes the project description, including specific changes made at the onsites, and site-specific mitigation measures.

**Well Site.** BLM approves the following APD(s) and support facilities:

	Well Name	Well #	Qtr/Qtr	Sec.	TWP	RNG	Lease #	Status
1	COTTONWOOD	615-4SH	SESE	6	41N	75W	WYW0314361	APD
2	COTTONWOOD	515-1SH*	SESE	6	41N	75W	WYW0314361	APD
3	COTTONWOOD	815-2SH	NENW	17	41N	75W	WYW0314361	APD
4	COTTONWOOD	1715-3SH	NWNE	17	41N	75W	WYW0275169	APD
5	COTTONWOOD	3025-1SH	SWSW	19	42N	75W	WYW0311966	APD
6	COTTONWOOD	1925-2SH	SWSW	19	42N	75W	WYW0311966	APD
7	COTTONWOOD	3125-3SH	NWNE	31	42N	75W	WYW0311966	APD

**Limitations.** There are no denials or deferrals. Also see the conditions of approval (COAs).

**THE FINDING OF NO SIGNIFICANT IMPACT (FONSI).** Analysis of Alternative B of the EA, WY-070-EA12-102, and the FONSI found the proposed Cottonwood 1 POD will have no significant impacts on the human environment beyond those described in the PRB FEIS, so there is no requirement for an EIS. There is no requirement for an EIS.

**COMMENT OR NEW INFORMATION SUMMARY.** BLM publically posted the proposed APDs for 30 days, received no comments, and then internally scoped them. BLM experience in the PRB (outside of the Fortification Creek Planning Area) revealed little public input or new issue discovery other than those revealed after public scoping during development of the PRB FEIS. New information regarding Greater Sage-Grouse (GSG) includes the 2012 BLM-contracted population viability analysis for the Northeast Wyoming GSG. That study found that there remains a viable population of GSG in the PRB (Taylor et al. 2012); however threats from energy development and West Nile Virus (WNV) are impacting future viability (Taylor et al. 2012). The study indicated that effects from energy development, as measured by male lek attendance, are discernible out to a distance of 12.4 miles.

**DECISION RATIONALE.** BLM bases the decision authorizing the selected project on:

1. BLM and DEP included mitigating design features and mitigation measures to reduce environmental impacts while meeting the project's need. For a complete description of all site-specific COAs associated with this approval, see the COAs.
2. DEP will conduct operations to minimize adverse effects to surface and subsurface resources, prevent unnecessary surface disturbance, and conform to currently available technology and practice. The selected alternative will not result in any undue or unnecessary environmental degradation. The PRB FEIS analyzed and predicted that the PRB oil and gas development would have significant impacts to the region's GSG population. The impact of this development, along with those in the EAs tiered to or incorporated by reference cumulatively contributes to the potential for local extirpation yet its effect is acceptable because it is outside priority habitats and is within the parameters of the PRB FEIS ROD and current BLM and Wyoming GSG conservation strategies.
3. The selected alternative will help meet the nation's energy needs, and help stimulate local economies by maintaining workforce stability.
4. The Operator committed to:
  - Comply with the approved APD, applicable laws, regulations, orders, and notices to lessees.
  - Obtain necessary permits from agencies.
  - Provide water well agreements the owners of record for permitted wells.
  - Provide water well analysis from a known reference point.
  - Incorporate several measures to alleviate resource impacts into their submitted surface use plan and drilling plan.
5. The Operator certified it has a surface access agreement or posted a 43 CFR 3814.1 bond.
6. The operator provided the BLM a true and complete copy of a document in which the owner of the surface authorizes the operator to drill a federal well from non-federal lands, and in which the surface owner or representative guarantees the Department of the Interior (Department), including BLM, access to the non-federal lands to perform all necessary surveys and inspections. (See BLM WO Instruction Memorandum No. 2009-078, p. 2, para 6).
7. The project is clearly lacking in wilderness characteristics as there is no federal surface.

**ADMINISTRATIVE REVIEW AND APPEAL.** This decision is subject to administrative review according to 43 CFR 3165. Request for administrative review of this decision must include information required under 43 CFR 3165.3(b) (State Director Review), including all supporting documentation. Such a request must be filed in writing with the State Director, Bureau of Land Management, P.O. Box 1828, Cheyenne, Wyoming 82003, no later than 20 business days after this Decision Record is received or considered to have been received. Any party who is adversely affected by the State Director's decision may appeal that decision to the Interior Board of Land Appeals, as provided in 43 CFR 3165.4.

Field Manager: \_\_\_\_\_

Date: \_\_\_\_\_

7/19/12


**FINDING OF NO SIGNIFICANT IMPACT**  
**Devon Energy Production Company, L.P., Cottonwood 1 Plan of Development (POD)**  
**Environmental Assessment (EA), WY-070-EA12-102**  
**Bureau of Land Management, Buffalo Field Office, Wyoming**

**FINDING OF NO SIGNIFICANT IMPACT (FONSI).** Based on the information in the EA, WY-070-EA12-102, which BLM incorporates here reference; I find that: (1) the implementation of Alternative B will not have significant environmental impacts beyond those addressed in the Buffalo Final Environmental Impact Statement (FEIS) 1985, and the Powder River Basin (PRB) FEIS, 2003, Cottonwood 1 Plan of Development (POD), WY-070-EA12-102 to which the EA tiers; (2) Alternative B conforms to the Buffalo Field Office (BFO) Resource Management Plan (RMP) (1985, 2001, 2003, 2011); and (3) Alternative B does not constitute a major federal action having a significant effect on the human environment. Thus an EIS is not required. I base this finding on consideration of the Council on Environmental Quality's (CEQ) criteria for significance (40 CFR 1508.27), with regard to the context and to the intensity of the impacts described in the EA, and Interior Department Order 3310.

**CONTEXT:** Mineral development is a common land use in the PRB, sourcing over 42% of the nation's coal. The PRB FEIS reasonably foreseeable development analyzed the development of 54,200 wells. The additional development in Alternative B is insignificant in the national, regional, and local context.

**INTENSITY:** The implementation of Alternative B will result in beneficial effects in the forms of energy and revenue production however; there will also be adverse effects to the environment. Design features and mitigation measures included in Alternative B will minimize adverse environmental effects. The preferred alternative does not pose a significant risk to public health and safety. The geographic area of project does not contain unique characteristics identified in the 1985 RMP, 2003 PRB FEIS, or other legislative or regulatory processes. BLM used relevant scientific literature and professional expertise in preparing the EA. The scientific community is reasonably consistent with their conclusions on environmental effects relative to oil and gas development. Research findings on the nature of the environmental effects are not highly controversial, highly uncertain, or involve unique or unknown risks. The PRB FEIS predicted and analyzed oil development of the nature proposed with this project and similar projects. The selected alternative does not establish a precedent for future actions with significant effects. The proposal relates to the PRB Greater Sage-Grouse and its habitat decline having cumulative significant impacts, yet the small size of this proposal is within the parameters of the impacts denoted in the PRB FEIS. There are no cultural or historical resources present that will be adversely affected by the selected alternative. The project area is clearly lacking in wilderness characteristics as there is no federally owned surface. No species listed under the Endangered Species Act or their designated critical habitat will be adversely affected. The selected alternative will not have any anticipated effects that would threaten a violation of federal, state, or local law or requirements imposed for the protection of the environment.

**ADMINISTRATIVE REVIEW AND APPEAL.** This finding is subject to administrative review according to 43 CFR 3165. Request for administrative review of this finding must include information required under 43 CFR 3165.3(b) (State Director Review), including all supporting documentation. Such a request must be filed in writing with the State Director, Bureau of Land Management, P.O. Box 1828, Cheyenne, Wyoming 82003, no later than 20 business days after this FONSI is received or considered to have been received. Any party who is adversely affected by the State Director's finding may appeal that finding to the Interior Board of Land Appeals, as provided in 43 CFR 3165.4.

For Field Manager: 

Date: 7/19/12

**ENVIRONMENTAL ASSESSMENT (EA), WY-070-EA12-102**  
**Devon Energy Production Company, L.P.,**  
**Cottonwood 1 Plan of Development (POD)**  
**Bureau of Land Management, Buffalo Field Office, Wyoming**

## **1. INTRODUCTION**

This EA analyzes 7 applications for permit to drill (APDs) conventional horizontal oil and natural gas wells and supporting infrastructure proposed by Devon Energy Production Company, L.P. (DEP or operator) at their Cottonwood 1 POD. BLM analyzes the notices of staking (NOS)/APDs to provide cumulative effects analysis on the reasonably foreseeable development and to establish a background analysis. This site-specific analysis tiers to and incorporates by reference the Final Environmental Impact Statement and Proposed Plan Amendment for the Powder River Basin Oil and Gas Project (PRB FEIS), WY-070-02-065, 2003, its Record of Decision (ROD), Ponderosa 215-1NH Well EA, WY-070-EA11-291, and House Creek Sandy POD EA, WY-070-11-144, pursuant to 40 CFR 1508.28 and 1502.21. One may review these documents at the BLM Buffalo Field Office (BFO) or on our website.

Congress made a 4-part process for federal fluid mineral decisions under the long-term needs of multiple-use. First, is the land use / resource management plan (RMP); here it is the PRB FEIS and ROD amendment to the BFO RMP. Second, are the decisions of whether and, if so, under what conditions, to lease lands for fluid mineral development. Courts held leasing decisions are an almost irrevocable resource commitment. Third, (this phase) is deciding on the proposed POD or APD, or both: the site-specific analysis, and mitigation. Fourth is the monitoring and reclamation of wells and their features.

### **1.1. Background**

DEP submitted the Cottonwood 1 POD proposal on September 16, 2011 to the BFO to produce oil and natural gas from federally managed fluid mineral bearing formations of the PRB, covered by privately owned terrain with relatively steep slopes. Standard split estate “federal lands” jurisdiction rules apply.

- November 8, 2011: BLM received 6 NOSs (4 locations), posted, assigned, and conducted onsite visits evaluating and modifying them to minimize environmental impacts.
- October 6, 2011: An operator information meeting (OIM) was held between BLM and DEP.
- February 7, 2012: DEP submitted the Cottonwood 1 POD to the BFO with 7 APDs (originally 6 wells, DEP added 1 more well to 1 of their locations).
- March 23, 2012: BLM, DEP, and the landowner onsited DEP’s proposed Fresh Water Supply pits for the Cottonwood 1 POD that DEP did not include in their original submittal.
- March 26, 2012: BFO sent DEP legal instrument examiner (LIE), PE, cultural, and NRS deficiencies and recommendations.
- May 8, 2012: BFO received replies to most of the deficiencies from DEP.
- May 18, 2012: BFO conducted additional cultural clearance for the access road to the Crossbow 615-4SH well and requested project shape files that were not turned in by DEP with the May 8, 2012 submittal. BLM sent DEP BLM legal instrument examiner (LIE) deficiencies that were not addressed by DEP with the deficiencies submitted by DEP on May 8, 2012.
- May 24, 2012: BLM initiated a 15 day consultation with the Wyoming State Historic Preservation Officer (SHPO) for the access road to the Crossbow 615-4SH well.
- June 4, 2012: The SHPO concurred with the Bureau’s determination.
- June 6, 2012: DEP addressed the BLM LIE deficiencies.
- July 10, 2012: BFO sent DEP a draft of the conditions of approval (COAs).
- July 12, 2012: DEP responded to the COA’s.

### **1.2. Need for the Proposed Project**

The need for this project is to determine whether, how, and under what conditions to support the Buffalo Resource Management Plan's (RMP) goals, objectives, and management actions (2003 Amendment) with allowing the exercise of the operator's conditional lease rights to develop fluid minerals on federal leases. APD information is an integral part of this EA, which BLM incorporates here by reference (CFR 1502.21). Conditional fluid mineral development supports the RMP and the Mineral Leasing Act of 1920, the Federal Land Policy Management Act (FLPMA), and other laws and regulations.

### **1.3. Decision to be Made**

The BLM will decide whether or not to approve the proposed development, and if so, under what terms and conditions agreeing with the Bureau's multiple use mandate, environmental protection, and RMP.

### **1.4. Scoping and Issues**

The BFO external scoping included a 30 day posting of proposed APDs and the EA's timely publication on the BFO website. Previously BFO conducted extensive external scoping for the PRB FEIS - discussed on p. 2-1 of the PRB FEIS and on p. 15 of the PRB ROD. This project is similar in scope to other fluid mineral development analyzed by the BFO. External scoping would be unlikely to identify new issues, as verified by the few fluid mineral EAs that were recently externally scoped. Recent external scoping in 2010 and 2011 for a geographically-focused proposed RMP amendment revealed no new issues outside of the geographically-specific issues.

The BFO interdisciplinary team (ID team) conducted internal scoping by reviewing the proposed development and project location to identify potentially affected resources and land uses. This EA will not discuss resources and land uses that are either not present, not affected, or that the PRB FEIS adequately addressed. The ID team identified important issues for the affected resources to focus the analysis. This EA addresses the project and its site-specific impacts that were unknown and unavailable for review at the time of the PRB FEIS analysis to help the decision maker come to a reasoned decision. Project issues include:

- Air quality
- Invasive species
- Soils and vegetation: site stability, reclamation potential
- Wildlife: raptor and sage-grouse productivity, special status species
- Cultural: National Register eligible sites, potential for alluvial deposits

These issues are not present, or minimally so, and were analyzed in the EIS and not analyzed in this EA:

Geological resources	Recreation	Wilderness characteristics
Cave and karst resources	Heritage & visual resources	Livestock & grazing
Mineral resources: locatable, leasable-coal, salable	Paleontological resources	Areas of critical environmental concern
Fire, fuels management, and rehabilitation	Water resources	Socio-economic resources
Forest products	Rights of way & corridors	Environmental justice
Lands & realty	Transportation & access	Tribal treaty rights

## **2. PROPOSED PROJECT AND ALTERNATIVE**

### **2.1. Alternative A – No Action**

The PRB FEIS considered a No Action Alternative, pp. 2-54 to 2-62. This alternative must also consider and aggregate the effects analyzed in the PRB FEIS analysis with incorporating by reference the

subsequent analysis and development from the adjacent and intermingled projects, see Table 3.1. This includes up to 514 wells: (485 coalbed natural gas (CBNG)) and 29 oil in a 4-mile area of effects of this proposal. The total number of conventional wells approved by BFO is 359, which includes 193 horizontal wells (as of March 2012). The WOGCC permitted 103 wells. The total is 453, which represents 14% of the projected 3,200 in the 2003 PRB ROD. (See Tables 2.4 and 2.5 for an approximation of the disturbance in the current situation.) This agrees with the PRB FEIS which analyzed the reasonably foreseeable development rolling across the PRB of over 51,000 coal bed natural gas (CBNG) and 3,200 natural gas and oil wells. The no action alternative would consist of no new federal wells. This alternative would deny these APDs and /or POD requiring the operator to resubmit APDs or a POD that complies with statutes and the reasonable measures in the PRB RMP ROD in order to lawfully exercise conditional lease rights. This alternative could, through secretarial discretion suspend the senior leasehold, or could administratively cancel or withdraw the lease if improperly awarded, or seek to cancel the lease. It is not possible in the abstract to identify every interest and that is beyond the scope here.

## 2.2. Alternative B Proposed Action

**Operator/Applicant:** Devon Energy Production Company, L.P. (DEP)

**Project Name:** Cottonwood 1 POD

**Table 2. Well Name/#/Lease/Location/Status:**

	Well Name and #	Qtr/Qtr	Sec.	TWP	RNG	Lease #	Status
1	Cottonwood 515-1SH	SESE	6	41N	75W	WYW0314361	APD
2	Cottonwood 615-4SH	SESE	6	41N	75W	WYW0314361	APD
3	Cottonwood 815-2SH	NENW	17	41N	75W	WYW0314361, WYW0275169	APD
4	Cottonwood 1715-3SH	NENW	17	41N	75W	WYW0314361, WYW0275169	APD
5	Cottonwood 1925-2SH	SWSW	19	42N	75W	WYW0311966	APD
6	Cottonwood 3025-1SH	SWSW	19	42N	75W	WYW0311966	APD
7	Cottonwood 3125-3SH	NWNE	31	42N	75W	WYW0311966	APD

\* DEP targets the Shannon formation at an average depth of 10,625 feet below the surface for all proposed APDs.

**Affected Surface Owners:** Iberlin Ranch Limited Partnership (IRLP): Mark Iberlin, General Manager (The area is clearly lacking wilderness characteristics as it lacks any federal surface.)

**COUNTY:** Campbell

The proposal involves:

**Table 2.1. Well Pad Disturbance During Construction and Interim/Production**

Well Name	Location	Status	Surface Disturbance	Interim Disturbance
Cottonwood	515-1SH	APD	7.30 acres	3.50 acres
Cottonwood	615-4SH	APD	Shared Location	Shared Location
Cottonwood	815-2SH	APD	9.70 acres	3.50 acres
Cottonwood	1715-3SH	APD	Shared Location	Shared Location
Cottonwood	1925-2SH	APD	9.70 acres	3.90 acres
Cottonwood	3025-1SH	APD	Shared Location	Shared Location
Cottonwood	3125-3SH	APD	9.10 acres	3.60 acres
<b>Totals</b>			<b>35.80 acres</b>	<b>14.50 acres</b>

**Table 2.2. Cottonwood Fresh Water Supply: Cottonwood North & South Hydraulic Fracturing Pits**

	Frac Pit Name	Surface Disturbance Drilling/Completion	Interim Disturbance
1	Cottonwood North Frac Pit	2.10 acres	0.0 acres
2	Cottonwood South Frac Pit	3.40 acres	0.0 acres
<b>Totals</b>		<b>5.50 acres</b>	<b>0.0 acres</b>

**Table 2.3. Cottonwood Fresh Water Supply Temporary Overland Lines**

Corridor Type	Submission Status	Surface Disturbance Drilling/Completion	Surface Disturbance Interim/Production
Corridor along Existing/Proposed	APD	5.38 acres	0.00 acres
<b>Totals</b>		<b>5.38 acres</b>	<b>0.00 acres</b>

Included as part of the road corridor disturbance. Overland lines corridor along existing and proposed roads.

**Table 2.4. Corridor Disturbance During Construction and Interim/Production**

Corridor Type	Submission Status	Length (ft)	Construction Width (ft)	Final Width (ft)	Surface Disturbance	Surface Disturbance Interim/Production
Existing Improved	APD	20,363	N/A	18.0	Existing	8.4 acres
Proposed Improved	APD	16,337	70	18.0	26.25 acres	6.8 acres
<b>Totals</b>					<b>26.25 acres</b>	<b>15.2 acres</b>

**Table 2.5. Overhead Power (OHP) Disturbance**

Overhead Power	Submission Status	Length (ft)	Width (ft)	Surface Disturbance Interim/Production
Existing Overhead Electric	APD	29,103	15	10.20 acres
Proposed Overhead Electric*	APD	13,373	15	4.61 acres
<b>Total New OHP</b>				<b>4.61 acres</b>

**Table 2.6. Power Drop Disturbance**

Electric Drops	Number of Drops	Surface Disturbance Per Power Drop (Acres)	Total Surface Disturbance (Acres)
APD	4	0.13	0.52

A third party will install and deliver the proposed electric power, and the existing line and proposed power drops are shown on the Cottonwood 1 Project Maps A and C. If the proposed overhead power (OHP) drops are changed by the third party at the time of construction, a sundry notice will be submitted to the BLM Authorized Officer. Note that the third party is responsible for compliance with regulatory agencies and is responsible for securing and maintaining the necessary rights-of-way (ROWs).



EA, Cottonwood 1 POD





**Table 2.7. Lease Ownership at Surface Hole Location (SHL) /Bottom Hole Location (BHL)**

Well Name and Number	Qtr/Qtr	Sec.	TWP	RNG	Lease Number	Surface Owner	Mineral Ownership Underlying SHL	Mineral Ownership Underlying BHL
Cottonwood 515-1SH	SESE	6	41N	75W	WYW0314361	IRLP	FED	FED
Cottonwood 615-4SH	SESE	6	41N	75W	WYW0314361	IRLP	FED	FED
Cottonwood 815-2SH	NENW	17	41N	75W	WYW0314361, WYW0275169	IRLP	FED	FED
Cottonwood 1715-3SH	NENW	17	41N	75W	WYW0314361 WYW0275169	IRLP	FED	FED
Cottonwood 1925-2SH	SWSW	19	42N	75W	WYW0311966	IRLP	FED	FEE
Cottonwood 3025-1SH	SWSW	19	42N	75W	WYW0311966	IRLP	FED	FED
Cottonwood 3125-3SH	NWNE	31	42N	75W	WYW0311966	IRLP	FED	FED
North Cottonwood 1 POD Fresh Water Supply Pit	SESE	25	42N	76W	NA	IRLP	FED	NA
South Cottonwood 1 POD Fresh Water Supply Pit	NWSW	8	41N	75W	NA	IRLP	FED	NA

All proposed wells have or cross federal minerals.

### Well Pads

Surface disturbance will be minimized at each drill location. The drill pads will need to be leveled and cut-and-fill dirt work will be performed. The location will be fenced with 32 inch woven wire (sheep tight) and 2 strands of barb wire on top. The fence will encompass a larger area than is required to be disturbed in order to allow for the movement of equipment and people around the location.

The approximate size of disturbance required for the drilling pad including the topsoil and spoil piles ranges from 7.30 to 9.70 acres depending on the wells' location. The surface disturbance for all 4 pad locations that are part of the Cottonwood 1 POD project total 35.80 acres. All surface disturbance related to drilling will be confined to the drill sites. Anticipated surface disturbance will be approximately 14.50 acres during interim/production.

Temporary lined mud (working) pits will be excavated at each well location (See Section 7, Cottonwood 1 POD, *Methods for Handling Waste* for pit specifications). The appropriate orientation of the temporary pit will control drill site layout (see well pad design sheets for Cottonwood 1 POD drilling pad layouts). The location will be fenced and livestock entry to the location will be restricted by a cattle guard.

Each lined mud pit will contain drill cuttings and any water used, or encountered, during drilling operations. No earthwork will be completed when the soil is saturated or when watershed damage is likely to occur. The pits will be designed to prevent the collection of surface runoff. An undisturbed vegetative border will be maintained between the location of the mud pit and the edge of adjacent drainages. All mud pits constructed for the drilling of the Cottonwood 1 POD wells will be lined.

A box on box Mechanical/Electrical drilling rig will be used for drilling operations. A fresh water low solid non dispersed drilling fluid will be used in the mud system at each well.

If drilling results in establishing commercial production from the proposed wells, production facilities at

each well will consist of the wellhead, pumping unit, oil tanks, water tanks, circulating pump, a flare, a vapor recovery unit (VRU), a treater, and possibly a gas separator. The oil and water tanks and the circulating pump will be set inside a containment berm. The VRU may or may not be within the containment berm.

### **Access Roads/Dust Abatement**

Traffic supporting the project will flow to the area via WY Highways 50 and 387. DEP will build the access roads to meet the standards of the anticipated traffic flow and all-weather requirements. Road construction will comprise of a total of 26.25 acres of disturbance during construction including the existing infrastructure and will be 15.16 acres during interim/production.

All proposed and existing access roads within the POD are identified and labeled on Map A and Map C within the Cottonwood 1 POD. Each road will be completed as a crowned and ditched single lane 18-foot subgrade road with a 70 foot corridor width of total disturbance (see Figure 1. Cottonwood POD Master Surface Use Plan (MSUP). The roads do not cross steep terrain or rough topography. All Cottonwood 1 POD access roads are proposed at a sufficient width to safely accommodate two-way traffic, thus DEP does not propose the use of turnouts on any of the Cottonwood 1 POD access roads.

Mileage and disturbance acreage for all roads are accounted for in the Surface Use Data Summary (SUDS) Form (See Attachment A) within the Cottonwood 1 POD.

If road surfacing material or additional structures are needed to maintain the access routes, the affected road segments will be identified for both landowner and BLM approval and all work will be completed as specified by the landowner and the BLM. If no specific BLM field survey requirements are provided, DEP will follow the field survey requirements for BLM temporary roads as outlined in the BLM guidebook Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development (The Gold Book 2007). If deemed necessary, water trucks will be used to apply water obtained from the DEP West Pine Tree CBNG Field, wells drilled to the Big George coal seam and located in various sections in Township 42 North, Range 76 West, to access roads during the late summer and fall months as a form of dust abatement. If CBNG water is used for dust abatement, DEP will apply for and secure a Wyoming Oil and Gas Conservation Commission (WOGCC) Chapter 3 road spread permit. See Attachment E, Cottonwood 1 POD for a representative water analysis from the DEP West Pine Tree CBNG Field.

All proposed and existing roads will be maintained as necessary to preserve drainage control (e.g., culverts, drainage dips, ditching, crowning, surfacing, etc.). A typical diagram describing general culvert design can be found in Figure 2.

Flagging material, painted wood survey lath or other directional markers will be temporarily placed along proposed access routes to serve as guides to the proposed wells as needed. Directional markers will be removed when no longer needed.

All proposed and existing roads within the Cottonwood 1 POD will be subject to construction best management practices, and interim and final reclamation guidelines as outlined in Item # 10 (pp. 9-16), Plans for Surface Reclamation. Topsoil will be salvaged and stockpiled before road construction activities begin. Soil material and overburden will not be pushed over side slopes or into drainages. Instead, disturbed soil material will be placed where it can be retrieved easily and where it cannot impede watershed and drainage flows. Reclamation and seeding will be completed as per Item #10, Plans for Surface Reclamation pursuant to the Wyoming Reclamation Policy.

The total acres of disturbance during construction and drilling of the project will consist of approximately 78.68 acres in total short term disturbance (construction disturbance) and 34.79 acres of disturbance in long term (interim disturbance).

**Drilling/Completion Water Sources and Amounts:**

Fresh water used for drilling and cementing will be obtained from outside the POD boundary and hauled to location by transport truck using the existing and proposed roads shown in Maps A and C for the Cottonwood 1 POD. DEP plans to obtain fresh water from the West Pine Tree CBNG Field Fink Prong pipeline at a diversion located in the SWNW, Section 18, TNS 41N RNG 75W (SEO Permit # P196903W) or at a diversion located in the NESW Section 31, TNS 42N RNG 75W (SEO Permit in process). All entities are gathering facilities for water produced from the Big George coal seam. The Fink Prong diversion is located in SWNW Section 18, Township 41 North, Range 75 West. DEP has diverted water from the Fink Prong Pipeline into an 8 inch poly-line that is laid on the surface of the land.

The poly-line does not cause any surface disturbance and can be cut and moved to facilitate the movement of water to different locations. See Maps A and C for the proposed route for the water supply line to be laid on the surface. The Fink Prong diversion in the SWNW Section 18, TNS 41N RNG 75W will be used to supply water for drilling of the Cottonwood 515-1SH/Cottonwood 615-4SH, the Cottonwood 815-2SH /Cottonwood 1715-3SH, and the South Cottonwood 1 POD fresh water storage pit. The Fink Prong diversion located in the NESW Section 31, Township 42 North, Range 75 West will be used to supply the Cottonwood 1925-2SH/Cottonwood 3025-1SH, the Cottonwood 3125-3SH, and the North Cottonwood I POD fresh water storage pit (See Maps A and C). An analysis representative of the West Pine Tree CBNG water is shown as Attachment E of the Cottonwood 1 POD MSUP. Devon plans an estimated 15,000 barrels of water (approximately 10-15 truckloads per day) will be required for drilling each well and an estimated 30,000 to 50,000 barrels of water will be required to hydraulically fracture each well.

DEP will construct 2 earthen pits to store the fresh water used in the hydraulic fracturing of the Cottonwood 1 POD wells. Both pits are bonded through the WOGCC, the North Cottonwood 1 POD pit bond number is Bond # 100753026-648 and the South Cottonwood 1 pit bond number is Bond # 100753026-649. Attachment F shows the approved WOGCC permits for each of the earthen fresh water pits to be constructed as part of the Cottonwood 1 POD. The North Cottonwood 1 POD hydraulic fracturing pit will be located in the SWSW Section 25, Township 42N Range 75W and will be used to store fresh water for operations on the Cottonwood 1925-1SH/3025-2SH and 3125-3SH wells. The south Cottonwood 1 pit will be located in the SWNW of Section 8, Township 41N, Range 75W and will be used to store fresh water for operations on the Cottonwood 515-1SH, 615-4SH, 815-2SH, and 1715-3SH. See MSUP's Table 7 for an association of Cottonwood 1 POD wells to each fresh water storage pit.

The alternative to an earthen pit is hauling in 50-60, 400 bbls tanks to set on the location. The disadvantages to tanks is that most of the locations would have to be constructed larger in order to accommodate the tanks and the well pads would have to be completely graveled in order to keep the tanks leveled, increasing the cost and difficulty of interim reclamation. Additionally, all tanks would have to be hauled to and from the site on trucks (1 tank / truck), increasing the amount of traffic and dust in the area.

**Average Daily Traffic (ADT):**

DEP estimates that during the drilling phase of each individual Cottonwood 1 POD well (about 6 to 8 week period per well) the average daily traffic to and from the location is approximately 2 large trucks (water haulers, cement trucks, etc.) and 6 personal pickup trucks per day. During the well completion process (a 3 to 4 week period per well) the average daily traffic increases to 4 to 6 large trucks and 6 personal pickup trucks per day. Finally, during the production phase the average daily traffic will

decrease to 1 to 2 pickup trucks per day.

**Produced Water:**

During the initial phase of well production the produced oil and water will be stored in tanks and then periodically trucked to disposal. The produced water will be trucked to an approved Class II disposal well or an evaporation facility. At any given time, DEP proposes to use 1 or 2 of the following disposal wells and or evaporation ponds. All 4 wells or ponds may be used through the lifetime of the project:

- Holler 1-11WIW owned by Tisdale Creek Ranch and located in Section 11, Township 52N, Range 72W, WDEQ Permit # 08-029
- Horse Creek #1-8 owned by Kissack Water and Oil Services and located in Section 8, Township 47N, Range 68W, WDEQ Permit #91-166 and 01-337 (Pit and Well Permit)
- Reed Fee 22-20 owned by Joe Scott Enterprises and located in Section 20, Township 55N, Range 73W, WDEQ Permit #06-333
- North Bill Disposal Facility owned by North Bill Disposal and located in Section 1, Township 38N, Range 71W, WDEQ Permit #11-227

If long-term economic production is determined possible for any of the Cottonwood 1 POD wells, then DEP proposes to install buried flow lines to transport the produced oil off of the location. Additional buried flow lines and a gas meter run will be installed to sell and transport any natural gas produced from the Cottonwood 1 POD wells. At such time as a well is deemed economic, then DEP will submit a sundry notice to the BLM in order to gain approval for the buried flow lines.

**DEP's Mitigating Design Features:**

The operator explored numerous best management practices (BMPs) and design features which reduce the project impacts to sensitive areas of limited reclamation potential (LRP), highly erosive soils, and steep slopes). DEP has chosen to incorporate these construction and stabilization practices into the project design features the majority of the impacts associated with the wells and infrastructure listed in "The Direct and Indirect" section of this document within chapter 4, and may have be reduced to a level already disclosed in the PRB FEIS, Volume 2, Chapter. The design features include:

- DEP will reduce the size of their locations by half or more within 180 days of completion of the said well. Thus reducing the total foot print of disturbance during interim reclamation.
- DEP committed to stabilizing access roads, well pads, and pipelines within 30 days of the completion of construction.
- Construct any roads used in development of this pod and place a minimum average of 4 inches of aggregate on roads before drilling activities start.
- DEP provided the following for Construction, Stabilization, and Reclamation Plan:
  - Objective: Establish a functioning ecosystem that provides and maintains hydrologic function, wildlife habitat, soil stability, domestic livestock grazing, and visual properties to promote final reclamation.

**Design Features for Drilling Phase:**

- Engineered design of the locations.
- Topsoil: amount of topsoil to be salvaged; how and where will it be stored is illustrated in the engineered designs and within Cottonwood 1 POD MSUP, section 10 (Reclamation).
- Methods used to prevent run-on/run-off, (cutslope pad, fillslope) are illustrated within the engineered designs. In addition, methods to prevent sediment leaving cut/fill slope and pad area; reduce velocity of any surface flow, containment of sediment onsite, monitor and maintain until drilling is complete is addressed by DEP within their MSUP for the Cottonwood 1 POD and also

is covered within the their Storm Water Prevention Plan (SWPP) .

#### Interim Reclamation Design Features:

- Pad size will be reduced to engineered diagram provided in the Cottonwood 1MSUP. Total foot print will be reduced by half or more of the original size.
- Gravel the working area and travel way of the pad. This will provide for all-weather access, reduce erosion and compaction, and promote reclamation.
- Drainage is designed to channel water from the pad (without concentrating and causing erosion) please see designs within the Cottonwood 1POD book. Apply topsoil evenly over entire disturbance area not needed for daily maintenance and operation.
- DEP provided BLM with a seed mix for Private surface with appropriate mix of native grasses (The entire project is on private surface).
  - DEP addresses seedbed preparation and method used to stabilize the site after seeding within Cottonwood 1 POD MSUP, section 10 (Reclamation).

#### Other

DEP should complete drilling and construction activities within 2 years, the term of an APD. Drilling and construction occurs year-round in the PRB. Weather may cause delays lasting several days but rarely do delays last multiple weeks. Timing limitations in the form of COAs and/or agreements with surface owner may impose longer temporal restrictions on portions of this project.

For a detailed description of design features and construction practices associated with the proposed project, refer to the surface use plan (SUP) and drilling plan included with the APD. Also see the subject APD for maps showing the proposed well location and associated facilities described above.

BLM incorporated and analyzed the implementation of committed mitigation measures in the SUP and drilling plan, in addition to the COAs in the PRB FEIS ROD. Additionally, the Operator, in their APD, committed to:

1. Comply with the approved APDs, applicable laws, regulations, orders, and notices to lessees.
2. Obtain necessary permits from agencies.
3. Provide water well agreements the owners of record for permitted wells.
4. Provide water well analysis from a known reference point.
5. Certify he has a surface access agreement with the landowner.

The Operator certified that a copy of the SUP was provided to the landowner.

#### **2.3. Conformance with the Land Use Plan and Other Environmental Assessments**

This proposal does not diverge from the goals and objectives in the Buffalo Resource Management Plan (RMP), 1985, 2001, 2003, 2011, and generally conforms to the terms and conditions of that land use plan, its amendments, and supporting FEISs, 1985 and 2003.

### **3. AFFECTED ENVIRONMENT**

This section briefly describes the physical and regulatory environment affected by of the alternatives in Section 2. Aspects of the affected environment here focus on the major issues. Find a screening of all resources and land uses potentially affected in administrative record. Resources unaffected, or not affected beyond the level analyzed in the PRB FEIS, are outside this EA's scope. The Wyoming Game and Fish Department's (WGFD's) Recommendations for Development of Oil and Gas Resources within Important Wildlife Habitats (2009), make no distinction between surface disturbance impacts per well type or drilling technology. BLM's position is there is a rare lack of distinction in surface disturbance

impacts attributable to well type, subject to showing a distinction, not a mere difference, and this tracks to surface disturbance issues as with soils, vegetation, invasive species, wetlands, cultural resources, etc. See, State Director Review WY-2010-023, Part 2, p. 3, fn. 7. This supports national and congressional policy where no distinction exists in 43 CFR 3160 et. seq, leasing, and 2005's Energy Policy Act (Kreckel 2007). The U.S. awarded the first patent for horizontal drilling in 1891. Stanolind Oil and Gas Corporation developed hydraulic fracturing in 1947. The industry improved the processes, along with drilling and completion technologies to where hydraulic fracturing is economical and developed over 1 million wells in the U.S.

### Project Area Description

The Cottonwood POD is approximately 7.5 miles WSW of Highway 50 and Highway 387 junction, Campbell County, WY. Located in the semiarid Powder River Basin, the project area is characterized by rolling hills divided by ephemeral drainages. Elevations within the area range from 5,211 feet (ft) in Section 19 T42N, R75W to 5,502 ft in Section 31 T42N, R75W. The climate of the area is known for long cold winters and short hot summers. The average maximum temperature is 34.3 degrees Fahrenheit in January and 85.5 degrees Fahrenheit in July. Mean annual precipitation is 13.51 inches (WRCC, 2010). In addition to the active oil and gas and coal bed natural gas field, the area within and surrounding the POD is a working livestock operation with cattle and sheep grazing. In addition, wildlife is managed on the properties for sporting purposes.

**Table 3.1. Adjacent/Overlapping Analysis Incorporated by Reference within 4 miles of the Cottonwood 1 POD EA**

	POD Name	Operator	Approval Date	NEPA EA #	Wells #
1	Coconut Grove	Bill Barrett	7/28/2005	WY-070-EA05-172	92
2	Palm Tree	Bill Barrett	5/28/2004	WY-070-EA04-190	71
3	Pine Tree Cutthroat	Devon	9/29/2006	WY-060-EA06-112	1
4	Pine Tree North and South	Bill Barrett	8/23/2007	WY-070-EA07-165	175
5	Brook Trout	Devon	9/17/2008	WY-070-EA08-129	50
6	Chasm	Yates	6/29/2011	WY-070-EA11-050	11
7	Grayling	Devon	3/1/2011	WY-070-EA10-332	85
8	Ponderosa 215-1NH	Devon	11/4/2011	WY-070-EA11-291	1

According to the Wyoming Oil and Gas Conservation Commission webpage in September of 2011, there were 74 well permits (not including the 6 proposed permits) within a 1 mile radius of the Cottonwood POD (Table 1.). Associated with the well locations is an extensive network of access roads, utility corridors, gas sales lines, overhead electric, central distribution points (CDPs), CBNG impoundments, and compressor locations.

**Table 3.2. Well Permits Within 1-mile of the Proposed Cottonwood Wells**

Well Type	Well Status	Number of Wells
Oil	Producing	10
Gas Well	Producing	31
Gas Well	Permit to Drill	29
Gas Well	Shut-In	4
<b>TOTAL WELLS</b>		<b>74</b>

DEP planned this project with input from the landowner in order to minimize surface disturbance and limit the environmental impacts. DEP will reduce the overall surface disturbance by designing the well pads to facilitate multiple horizontal wells. In the event that 2 federal wells are on the same well pad, DEP

committed to drill the wells in succession in order to minimize the amount of time that the reserve pit is open and to expedite reclamation of the location to the interim well pad size and shape.

### **3.1. Air Quality**

Refer to the PRB FEIS pp. 3-291 to 3-299, for a 2003-era description of the air quality conditions. BLM incorporates by reference, Update of Task 3A Report for the Powder River Basin Coal Review Cumulative Air Quality Effects for 2020, BLM (AECOM), 2009, (Cumulative Air Quality Effects, 2009) as it captures the cumulative air quality effects of present and projected PRB fluid and solid mineral development. The Environmental Protection Agency (EPA) established ozone standards in 2008, finalizing them in 2011. Existing air quality in the PRB is “unclassified/attainment” with all ambient air quality standards. It is also in an area that is in prevention of significant deterioration zone. PRB air quality is a rising concern due to ozone in the oil and gas producing Upper Green River Basin that became 1 of the nation’s 40 “nonattainment” zones for ozone in 2012; in addition to PRB-area air quality alerts issued in 2011 for particulate matter (PM), attributed to coal dust. Four sites monitor the air quality in the PRB: Cloud Peak in the Bighorn Mountains, Thunder Basin northeast of Gillette, Campbell County south of Gillette, and Gillette. In addition, the Wyoming Air Resource Monitoring System (WARMS) measures meteorological parameters from 6 sites, and particulate concentrations from 5 of those sites, monitors speciated aerosol (3 locations), and evapotranspiration rates (3 locations). These sites are at Sheridan, Taylor Reservoir, South Coal Reservoir, Buffalo, Juniper, and Newcastle. The northeast Wyoming visibility study is ongoing by the Wyoming Department of Environmental Quality (WDEQ). Sites adjacent to the Wyoming PRB-area are at Birney on the Tongue River 24 miles north of the Wyoming-Montana border, Broadus on the Powder River in Montana, and Devils Tower.

Existing air pollutant emission sources in the region include:

- Exhaust emissions (primarily CO and nitrogen oxides (NOx)) from existing natural gas fired compressor engines used in production of natural gas and CBNG; and, gasoline and diesel vehicle tailpipe emissions of combustion pollutants;
- PM (dust) generated by vehicle travel on unpaved roads, windblown dust from neighboring areas, road sanding during the winter months, and coal mines and trains;
- Transport of air pollutants from emission sources located outside the region;
- NOx, PM, and other emissions from diesel trains and,
- SO2 and NOx from power plants.

### **3.2. Soils and Vegetation**

#### **3.2.1. Soils**

Soils within the project area developed in alluvium and residuum derived mainly from the Wasatch Formation. Lithology consists of light to dark yellow and tan siltstone and sandstones with minor coal seams resulting in a wide variety of surface and subsurface textures. Soil depths vary from moderately deep (20-40 inches) to deep (>40 inches). Differences in lithology produced topographic and geomorphic variations in the area. Summits and shoulder landscape positions are often comprised of shallower soils, with backslopes, footslopes, and toeslope generally having deeper more developed soils.

Soils differ with topographic location, slope and elevation. Topsoil depths to be salvaged for reclamation range from 0 to 4 inches on shallow sites to 8+ inches in deep well developed soils. Erosion potential varies depending on the soil type, vegetative cover, and slope. Reclamation potential of soils also varies throughout the project area. The main soil limitations in the project area include: depth to bedrock, low organic matter content, texture classes, and high erosion potential especially in areas of steeper slopes.

Detailed soils identification and data for the project area were obtained from the South Campbell County Survey Area, Wyoming Soil Survey Geographic (SSURGO) Database (WY605). The soil survey was



performed by the Natural Resource Conservation Service (NRCS) according to National Cooperative Soil Survey standards. The BLM uses county soil survey information to predict soil behavior, limitations, or suitability for a given activity or action. The agency's long term goal for soil resource management is to maintain, improve, or restore soil health and productivity, and to prevent or minimize soil erosion and compaction. Soil management objectives are to ensure that adequate soil protection is consistent with the resource capabilities. Soils and landforms within the project area present distinct to conventional oil development and eventual site reclamation.

A tabulated list of the soil map units impacted by each proposed well location follows, along with their associated ecological site and represented slope value.

**Table 3.3. Wells, Soils, Ecological Sites, and Slope (information for well location only)**

Well	Map Unit	Map Unit Name	Disturbance	Ecological site	Slope
Cottonwood 515-1SH	113	Bidman-Ulm loams, 0 to 6 percent slopes	7.30 acres overall (450x570 Working Area)	Loamy (Ly) 10-14 NP	5%
Cottonwood 615-4SH			Shared Location		
Cottonwood 815-2SH	147	Forkwood-Cushman loams, 6 to 15 percent slopes	9.70 acres overall (450x570 Working Area)	Loamy (Ly) 10-14 NP	5%
Cottonwood 1715-3SH			Shared Location		
Cottonwood 1925-2SH	208	Savageton-Silhouette clay loams, 0 to 6 percent slopes	9.70 acres overall (450x570 Working Area)	Clayey (CY) 10-14 NP	6%
Cottonwood 3025-1SH			Shared Location		
Cottonwood 3125-3SH	158	Hiland-Bowbac fine sandy loams, 6 to 15 percent slopes	9.10 acres overall (450x510 Working Area)	Sandy (Sy) 10-14 NP	8%
<b>Totals</b>			<b>35.80 acres</b>		

See the NRCS Soil Survey WY605 – Southern Campbell County (SSURGO) data for more detailed soil information. Ecological Site interpretations include additional site-specific soil information.

Other important though less visible soil characteristics were identified in the project area using SSURGO Data, onsite investigation, and project design review, these are listed below. Well site locations and design features were analyzed in the document due to the size of disturbance and the potential duration of the proposed disturbance. These issues will be addressed in the design features of the APD.

- Predicted disturbance would impact soils by exposing material deep within the soil material, which may have chemical and physical properties contributing to limited reclamation potential (LRP) properties.
- Amount of bareground, physical and chemical properties, and site conditions create sites classified as highly erosive to wind and water erosion.
- The proposed cut and fill slopes during drilling/completion= 1½:1 (67%) - 2:1 (50%) slopes contribute to the erosion classification and exceed the 25% slope restriction.

Roads and other linear features will be mitigated through designs meeting the 9113 Manual requirements and completing construction, including surfacing, before drilling activity begins. These requirements will be in the form of COAs attached to this document and discussed during the NOS onsite investigation. The operator has committed within their MSUP Section 10 to stabilize measures all locations, roads, etc., within 30 days of initiation of construction activities.

### 3.3. Vegetation and Ecological Sites

BLM staff identified the dominant vegetation community types, Table 3.4, in the project area are mixed grass prairie and sagebrush shrubland. Species typical of the mixed-grass prairie community type are western wheatgrass (*Pascopyrum smithii*), blue grama (*Bouteloua gracilis*), needle-and-thread (*Hesperostipa comata*), and Wyoming big sagebrush (*Artemisia tridentata* var. *wyomingensis*), while species typical of the sagebrush shrubland include *Artemisia* spp. (*Chrysothamnus* spp.), western wheatgrass, prairie junegrass (*Koeleria macrantha*), and plains pricklypear (*Opuntia* spp.).

In addition, bluebunch wheatgrass (*Pseudoroegneria spicata*), green needlegrass (*Nassella viridula*) were identified in the project area. Additional forb and shrub species observed during the site visit included yucca (*Yucca glauca*), common yarrow (*Achillea millefolium*), penstemons (*penstemon* spp.), American vetch (*Vicia americana*), and milkvetch (*Astragalus* spp.). Non-native graminoids present included cheatgrass (*Bromus tectorum*), which is quite extensive in the project area. Cheatgrass is the dominant species present in some locations.

**Table 3.4. NRCS Ecological Site Determinations and Plant Communities Associated with Wells**

Well Name	NRCS Ecological Site Description	(%)	Vegetative Plant Community
515-1SH	Loamy (10-14NP)	100	Western Wheatgrass/Cheatgrass Plant Community
615-3SH			
815-2SH	Loamy (10-14NP)	100	Western Wheatgrass/Cheatgrass Plant Community Rhizomatous wheatgrasses/Needleandthread/Blue Grama Plant Community
1715-3SH			
1925-2SH	Loamy (10-14NP)	30	Mixed Sagebrush/Grass Plant Community
3025-1SH	Clayey (10-14NP)	70	Mixed Sagebrush/Grass Plant Community
3125-4SH	Sandy (10-14NP)	50	Needleandthread/Threadleaf Sedge/Fringed Sagwort Plant Community
	Loamy (10-14NP)	50	Mixed Sagebrush/Grass Plant Community

Ecological site descriptions provide site and vegetation information needed for resource identification, management, and reclamation recommendations. BLM specialists used NRCS published soil survey information, verified through onsite field reconnaissance, to determine the appropriate ecological sites for disturbances associated with individual well locations and road construction activities. Dominant or important ecological sites and plant communities identified in the project area are listed in Table 3.4. Refer to ecological site narrative sections below for description of vegetation species observed during onsite field visits.

The ecological sites identified were variable and consisted of loam, sandy, and clayey sites in 10-14 inch precipitation zone of the Northern Plains, the shallow counterpart to these sites were also present. Site specific topsoil salvage depths and seed mixes are include in the COAs section of this document.

Loamy Sites occur on gently undulating rolling land on landforms which include hill sides, alluvial fans, and ridges in the 10-14 inch precipitation zone. The soils are moderately deep to very deep (greater than 20 inches to bedrock), well-drained and formed in alluvium and residuum derived from sandstone and shale. These soils have moderate permeability.

The present plant community is a Mixed Sagebrush/Grass. Wyoming big sagebrush is a significant component of this Mixed Sagebrush/Grass plant community. Cool-season mid-grasses make up the majority of the understory with the balance made up of short warm-season grasses, annual cool-season

grass, and miscellaneous forbs. Dominate vegetation include needleandthread, western wheatgrass, green needlegrass, blue grama, prairie junegrass and Sandberg bluegrass. Other grasses occurring on the state include Cusick's and Sandberg bluegrass, and prairie junegrass. Cheatgrass has invaded the state. Other vegetative species identified at onsite include: pricklypear, and fringed sagewort.

Sandy Sites occur on nearly level to steep slopes on landforms which include alluvial fans, hillsides, plateaus, ridges, and stream terraces in the 10-14 inch precipitation zone. The soils of this site are moderately deep to very deep (greater than 20 inches to bedrock), well drained soils that formed in eolian deposits or residuum derived from unspecified sandstone. These soils have moderate, moderately rapid, or rapid permeability. The main soil limitations include low available water holding capacity, and high wind erosion potential.

The present plant community is a Needleandthread/ Threadleaf sedge/ Fringed sage Plant Community. Cool-season mid-grasses make up the majority of the understory with the balance made up of short warm-season grasses, annual cool-season grass, and miscellaneous forbs. The dominate understory grasses includes needleandthread, threadleaf sedge, prairie junegrass, and fringed sagewort.

Clayey Sites occur on nearly level to steep slopes on landforms which include hill sides, alluvial fans and stream terraces in the 10-14 inch precipitation zone. The soils of this site are moderately deep to very deep (greater than 20 inches to bedrock), well-drained soils that formed in alluvium or alluvium over residuum. These soils have slow permeability. The bedrock is clay shale which is virtually impenetrable to plant roots.

The present plant community is a Mixed Sagebrush/Grass. Wyoming big sagebrush is a significant component of this Mixed Sagebrush/Grass plant community. Big sagebrush is a significant component of this plant community. Cool-season grasses make up the majority of the understory with the balance made up of short warm-season grasses, annual cool-season grass, and miscellaneous forbs. Dominant grasses include rhizomatous wheatgrasses, green needlegrass, blue grama, and prairie junegrass. Forbs include Louisiana sagewort (cudweed), plains wallflower, hairy goldaster, and scarlet globemallow. Fringed sagewort and plains pricklypear also occur.

### **3.4. Water Resources**

WDEQ assumed primacy from EPA for maintaining Wyoming's water quality. The Wyoming State Engineer's Office (WSEO) has authority for regulating water rights issues and permitting impoundments for the containment of the State's surface waters.

#### **3.4.1. Groundwater**

The historical use for groundwater in this area was for stock or domestic water purposes. A search of the Wyoming State Engineer's Office (WSEO) Ground Water Rights Database showed there are 14 existing (completed) water wells in the 1 mile effects analysis area: all of the completed wells are dual purpose for CBNG and stock. These wells range from 800 to 1,481 feet deep. There are several other wells permitted as CBNG/stock however, they have yet to be completed or have been cancelled. Refer to the PRB FEIS for additional information on groundwater, pp. 3-1 to 3-36. WDEQ assumed primacy from EPA for maintaining Wyoming's water quality. The WSEO has authority for regulating water rights issues and permitting impoundments for the containment of the State's surface waters.

#### **3.4.2. Surface Water**

Most of the area drainages are ephemeral (flowing only in response to a precipitation event or snow melt) to intermittent (flowing only at certain times of the year when it receives water from alluvial groundwater,

springs, or other surface source – PRB FEIS, Glossary). The channels are primarily well vegetated grassy swales, without defined bed and bank. See generally the PRB FEIS for a surface water quality discussion, pp. 3-48 to 3-49. For more information on surface water refer to the PRB FEIS, pp. 3-36 to 3-56.

### **3.5. Wetlands/Riparian**

The Cottonwood 1 POD is located in the semiarid Powder River Basin; the project area is characterized by rolling hills divided by ephemeral drainages. The ephemeral drainages have gentle slope with well vegetated bottoms with numerous small head-cut features.

### **3.6. Invasive Species**

DEP discovered no state-listed noxious weeds and invasive/exotic plant infestations by a search of inventory maps and/or databases or during subsequent field investigation. However, the database illustrates that there is the potential for Scotch thistle along Highway 387. Weeds of concern are listed within the operators Integrated Pest Management Plan, p. 9 with the Cottonwood 1 POD. Cheatgrass or downy brome (*Bromus tectorum*) and to a lesser extent, Japanese brome (*B. japonicus*) exist in the affected environment. These species are found in high densities and numerous locations in NE Wyoming.

### **3.7. Fish and Wildlife**

The PRB FEIS identified wildlife species occurring in the PRB, pp. 3-113 to 3-206. The BLM wildlife biologist performed a habitat assessment in the project area on November 8, 2011 and March 23, 2012. The biologist evaluated impacts to wildlife resources and recommended project modifications where wildlife issues arose. BLM wildlife biologists also consulted databases compiled and managed by BLM BFO wildlife staff, the PRB FEIS, WGFD datasets, and the Wyoming Natural Diversity Database (WYNDD) to evaluate the affected environment for wildlife species that may occur in the project area. This section describes the affected environment and impacts to wildlife known or likely to occur in the area of the proposed project.

#### **3.7.1. Big Game**

The PRB FEIS discussed the affected environment for pronghorn, mule deer, white-tailed deer, and elk on pp. 3-117 to 3-122, pp. 3-127 to 3-132, 3-122 to 3-127, and 3-132 to 3-140, respectively. The big game species occurring in the project area are pronghorn and mule deer. The project area includes both yearlong and winter-yearlong range. Yearlong use is when a population of animals makes general use of suitable documented habitat sites within the range on a year-round basis. Animals may leave the area under severe conditions. Winter-yearlong use is when a population or a portion of a population of animals makes general use of the documented suitable habitat sites within this range on a year-round basis, but during the winter months there is a significant influx of additional animals into the area from other seasonal ranges. Pronghorn populations in the project area are above the Wyoming Game & Fish Department objectives where mule deer populations are slightly below. Both mule deer and pronghorns, and their sign, were observed during the onsite visit.

### 3.7.2. Migratory Birds

The PRB FEIS discussed the affected environment for migratory birds on pp. 3-150 to 3-153. Migratory birds are birds that migrate for breeding and foraging at some point in the year. The BLM-Fish and Wildlife Service (FWS) Memorandum of Understanding (MOU) (2010) promotes the conservation of migratory birds, complying with Executive Order 13186 (Federal Register V. 66, No. 11). BLM must include migratory birds in every NEPA analysis of actions that have potential to affect migratory bird species of concern to fulfill obligations under the Migratory Bird Treaty Act (MBTA). The MBTA (and Bald and Golden Eagle Protection Act (BGEPA)) are strict liability statutes so require no intent to harm migratory birds through prosecuting a taking. Recent prosecutions or settlements in Wyoming and the West cost companies millions of dollars in fines and restitution (which was usually retrofitting powerlines to discourage perching to minimize electrocution or shielding ponds holding toxic substances). BLM encourages voluntary design features and conservation measures supporting migratory bird conservation, in addition to appropriate restrictions.

A wide variety of migratory birds may be found in the proposed project area at some time throughout the year. Many species that are of high management concern use shrub-steppe and shortgrass prairie areas for their primary breeding habitats (Saab and Rich 1997). Nationally, grassland and shrubland birds declined more consistently than any other ecological association of birds over the last 30 years (WGFD 2009).

The WGFD Wyoming Bird Conservation Plan (Nicholoff 2003) identified 3 groups of high-priority bird species in Wyoming: Level I – those that clearly need conservation action, Level II – species where the focus is on monitoring, rather than active conservation, and Level III – species that are not a high priority but are of local interest. Shrub-steppe vegetation dominates the project area. Many species that are of high management concern use shrub-steppe areas for their primary breeding habitats (Saab and Rich 1997). Nationally, grassland and shrubland birds declined more consistently in the last 30 years than any other ecological association of birds (WGFD 2009). Species that may occur in these vegetation types in northeast Wyoming, according to the Wyoming Bird Conservation Plan, appear Table 3.5., grouped by level as identified in the plan.

Several migratory species are also BLM special status (sensitive) species. Those suspected to occur in the project area including: *Brewer's sparrow*, *loggerhead shrike* and *ferruginous hawk*.

**Table 3.5. Migratory Birds Occurring in Shrub-steppe Habitat, NE Wyoming (Nicholoff 2003)**

Level	Species	Wyoming BLM Sensitive
Level I	Brewer's sparrow	Yes
	Ferruginous hawk	Yes
	McCown's longspur	No
	Sage sparrow	Yes
Level II	Lark bunting	No
	Lark sparrow	No
	Loggerhead shrike	Yes
	Sage thrasher	Yes
	Vesper sparrow	No
Level III	Common poorwill	No
	Say's phoebe	No

### **3.7.3. Raptors**

The PRB FEIS discussed the affected environment for raptors, pp. 3-141 to 3-148. According to the BLM raptor database and ICF International (2011) there are 21 raptor nest sites within 0.5 miles of the project boundary (see Appendix A, Table A.2. Most raptor species nest in a variety of habitats including (but not limited to): native and non-native grasslands, agricultural lands, live and dead trees, cliff faces, rock outcrops, and tree cavities. Suitable nesting habitat is present in the project area.

### **3.7.4. Federally Listed Species**

The Buffalo BLM receives a species list periodically from the FWS concerning threatened, endangered and candidate species. The 2011 list included Ute Ladies'-tresses orchid (threatened) and Greater Sage-Grouse (GSG) (candidate). In addition to the listed species, the FWS letter also included migratory birds and wetland/riparian habitats.

#### **3.7.4.1. Ute Ladies'-Tresses Orchid (ULT)**

The FWS lists the ULT as threatened. The PRB FEIS discussed the affected environment for ULT, p. 3-175, which BLM incorporates here by reference. The Wyoming Natural Diversity Database model predicts undocumented populations may be present in southern Campbell and northern Converse Counties. Scientists only documented 4 orchid populations in Wyoming prior to 2005. Scientists found 5 additional sites in 2005 and 1 in 2006. The new locations were in the same drainages as the original populations, with 2 on the same tributary and within a few miles of an original discovery. Drainages with documented orchid populations include Antelope Creek in northern Converse County, Bear Creek in northern Laramie and southern Goshen Counties, Horse Creek in Laramie County, and Niobrara River in Niobrara County. The Cottonwood 615-2SH/4SH and 815-2SH/1715-3SH in T41N, R75 Sections 8 and 7 respectively are in close proximity to portions of the Ninemile Creek drainage which is classified as potential habitat for ULTs approximately 3 miles from the project area. Project components however, are on upland sites out of habitat for ULT. The known population of ULTs in Wind Creek portion of the Antelope Creek drainage is approximately 6.8 miles to the southeast of the project area.

### **3.7.5. Candidate Species**

#### **3.7.5.1. Greater Sage-Grouse (GSG)**

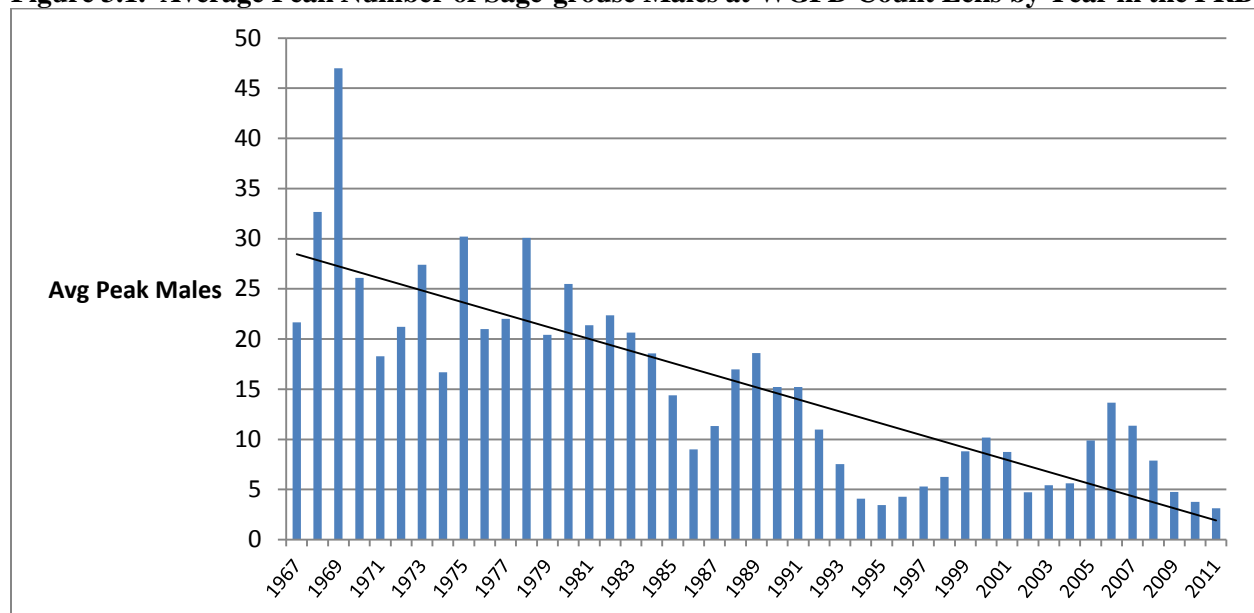
The PRB FEIS addressed the affected environment for GSG, pp. 3-194 to 3-199. GSG's regulatory and biologic status changed since issuance of the FEIS:

1. 2005-2007: The PRB FEIS predicted that a ¼ mile year-round controlled surface use lek buffer, and timing limitations restricting surface disturbance within 2 miles of leks, would be sufficient for protection of GSG populations. Several recent studies and literature reviews indicate that the restrictions' spatial scale, and timing limitations, may not be large enough to alleviate impacts to GSG (Holleran 2005, Walker et al 2007, Taylor et al 2012).
2. January, 2005: the FWS warranted that the sage-grouse was inappropriate for listing under the Endangered Species Act.
3. December, 2007: The U.S. District Court remanded the "not warranted" decision, finding a flawed decision-making process and ordered the FWS to conduct a new Status Review; *Western Watersheds Project v. FWS*, 535 F. Supp. 2d 1173 (D. Idaho 2007).
4. August, 2008: The WY BLM implemented management of identified connectivity habitats in support of the population management objectives set by the State of Wyoming (Wyoming Governor's Executive Order (EO) 2011-5), in accordance with the BLM Wyoming Instruction Memorandums (IM), most recently, IM- WY-2012-019.
5. January 2008: The State Wildlife Agencies' Ad Hoc Committee for Consideration of Oil and Gas Development Effects to Nesting Habitat recommended land managers consider impacts on leks within 4 miles of oil and gas developments.

6. September, 2009: In its Recommendations for Development of Oil and Gas Resources within Important Wildlife Habitats, WGFD categorized impacts to GSG by number of well pad locations per square mile within 2 miles of a lek.
7. November, 2010: FWS warranted that the GSG justified listing across its range, but precluded listing due to higher priorities (FWS 2010). The GSG is a listing candidate.
8. March, 2012: WY BLM released the report, “Viability analyses for conservation of GSG populations: Buffalo Field Office, Wyoming,” indicating that a viable population of GSG remains in the PRB, but the combined impacts of multiple stressors, including West Nile virus (WNV) and energy development, threaten that viability (Taylor et al 2012).

The GSG population in northeast Wyoming is exhibiting a steady long term downward trend, as measured by lek attendance (WGFD 2011b). Figure 3.1 illustrates a 10-year cycle of periodic highs and lows. Each subsequent population peak is lower than the previous peak. Research suggests that the declines since 2001 are a result, in part, of energy development (FWS 2010, Taylor et. al. 2012).

**Figure 3.1. Average Peak Number of Sage-grouse Males at WGFD Count Leks by Year in the PRB**



WGFD records indicate that 9 GSG leks occur within 4 miles of the project area. These leks are listed in Table 3.2, below. Currently there are 690 existing (producing or approved) wells within a 4 mile radius of these 9 leks, Wyoming Oil and Gas Commission [WOGCC], May 24, 2012).

According to parameters set by WGFD (2009) ([AFMSS] and [WOGCC], March 20, 2012) all of the leks are experiencing high to extreme impacts from energy development except for the Collins Southwest lek which is experiencing moderate impacts. The general trend for the peak lek numbers in the project vicinity has been a steady, sharp decline.



**Table 3.6. Greater Sage-Grouse Leks within 4 miles of the Project Area**

Lek Name	Distance to Project (mi)	Occupied?	Year: Peak Males	
Brown Ranch	3.0 north	Yes	2011: 2 2010: 0 2009: 2	2008: 7 2007: 8
Cedar Canyon	3.2 northwest	Yes	2011: 2 2010: 6 2009: 8	2008: 19 2007: 54
Collins	0.4 northwest	No	2011: 0 2010: 0 2009: 0	2008: 0 2007: 8
Collins North	1.2 north	Yes	2011: 0 2010: 0 2009: 0	2008: 0 2007: 0
Collins Southeast	Within the project	Yes	2011: 14 2010: 13 2009: --	2008: -- 2007: --
Collins Southwest	1.5 west	Yes	2011: 3 2010: 6 2009: 10	2008: 22 2007: 29
Cottonwood Creek 3	3.6 northwest	Yes	2011: 0 2010: 0 2009: 0	2008: 0 2007: 2
Mai Tai	2.6 southeast	Yes	2011: 0 2010: 0 2009: 6	2008: 13 2007: 18
T-Chair	1.6 northeast	Yes	2011: 0 2010: 2 2009: 3	2008: 10 2007: 19

Impacts from oil and gas development are most discernible at the spatial scale of 20 km (12.4 mi) (Taylor et al. 2012). These findings echo results from previous studies conducted in the basin, wherein biologists observed basin-wide population declines (Walker et al. 2007). There are 28 documented leks within 12.4 miles of the Cottonwood project. None are in core habitat areas.

#### *Site Specific Habitat*

The project area is approximately 17 miles from the nearest core area. Sage-grouse habitat models indicate that the project area may contain high quality sage-grouse nesting habitat (Walker et al. 2007). BLM confirmed suitable nesting and brood rearing habitat in the project area during the onsite visit.

#### **3.7.6. Special Status (Sensitive) Species (SSS)**

The PRB FEIS discussed the affected environment for SSS, p. 3-174 to 201. The authority for the SSS comes from the ESA, as amended; Title II of the Sikes Act, as amended; the FLPMA; Department Manual 235.1.1A and BLM Manual 6840. Appendix A, Table A.1, lists those SSS that may occur in the project area. The Table also includes a brief description of the habitat requirements for each species. Wyoming BLM annually updates its list of SSS to focus management to maintain habitats to preclude listing as a threatened or endangered species. The policy goals are:

- Maintaining vulnerable species and habitat components in functional BLM ecosystems;
- Ensuring sensitive species are considered in land management decisions;

- Preventing a need for species listing under the Endangered Species Act (ESA); and
- Prioritizing needed conservation work with an emphasis on habitat.

Wyoming BLM updates SSS on its website: <http://www.blm.gov/wy/st/en/programs/Wildlife.html>. BLM discusses those SSS impacted beyond the level analyzed in the PRB FEIS, below.

### 3.8. Aquatics

The PRB FEIS discussed the ecosystem and fishery, pp. 3-153 to 3-166. The project area is in the Powder River and Belle Fourche watersheds although the drainages in the area are ephemeral and not likely to reach major streams. Recent investigations in the Powder River (Peterson et al 2011) indicate the middle reach of the Powder may be impacted by CBNG development: “Multiple lines of evidence indicated a decline in biological condition in the middle reaches of the Powder River, potentially indicating cumulative effects from coalbed natural gas discharges within one or more reaches between Flying E Creek and Wild Horse Creek in Wyoming. The maximum concentrations of alkalinity in the Powder River also occurred in the middle reaches.” Further analysis and monitoring is continuing to confirm or refute this trend.

### 3.9. West Nile Virus

West Nile virus (WNV) is a mosquito-borne disease that can cause encephalitis or brain infection. Mosquitoes spread this virus after feeding on infected birds and then bite people, other birds, and animals. WNV is not spread by person-to-person contact, and there is no evidence that people can get the virus by handling infected animals.

Since its discovery in 1999 in New York, WNV established and spread across the United States. Birds are the natural vector host and serve not only to amplify the virus, but to spread it. *Culex tarsalis* appears to be the most common mosquito vector. Mosquitoes can hatch from standing water in as few as 4 days. BLM summarized USGS data found at [www.westnilemaps.usgs.gov](http://www.westnilemaps.usgs.gov) in Table 3.7. Reported data from the PRB includes Campbell, Sheridan, and Johnson Counties.

**Table 3.7. Historical West Nile Virus Information**

Year	Total WY Human Cases	Human Cases PRB	Equine Cases PRB	Bird Cases PRB
2001	0	0	0	0
2002	2	0	15	3
2003	392	85	46	25
2004	10	3	3	5
2005	12	4	6	3
2006	65	0	2	2
2007	155	22	Unk	1
2008	10	0	0	0
2009	10	1	1	No record
2010	6	0	0	0
2011	3	0	Unk	No record

**Source:** Wyoming Department of Health, [http://diseasemaps.usgs.gov/wnv\\_wy\\_human.html](http://diseasemaps.usgs.gov/wnv_wy_human.html)

Human cases of WNV in Wyoming occur primarily in the late summer or early fall. Scientists found WNV in 157 bird species, horses, 16 other mammals, and alligators (Marra et al 2003). In the eastern US, avian populations incurred very high mortality, particularly corvids (crows, jays). Raptor species also appear to be highly susceptible to WNV. Wyoming scientists documented in 2003 that 36 raptors died from WNV in

Wyoming, including golden eagle, red - tailed hawk, ferruginous hawk, American kestrel, Cooper 's hawk, northern goshawk, great-horned owl, prairie falcon, and Swainson 's hawk (Cornish et al. 2003).

The Wyoming State Vet Lab determined 22 GSG in one study project (90% of the study birds), succumbed to WNV in the PRB in 2003. While birds infected with WNV have many of the same symptoms as infected humans, they appear to be more sensitive to the virus (Rinkes 2003). Current science suggests a synergy between WNV and energy development amplifying the negative impact GSG (FWS 2010 p. 13947). There is usually increased surface water in the PRB associated with CBNG development. This increase in potential mosquito breeding habitat provides opportunities for mosquito populations to increase. Preliminary research conducted in the PRB indicates WNV mosquito vectors were notably more abundant on a developed CBNG site than 2 similar undeveloped sites (Walker et al. 2003). The WDEQ and the Wyoming Department of Health sent a letter to CBNG operators on June 30, 2004. The letter encouraged people employed in occupations that require extended periods of outdoor labor, be provided educational material by their employers about WNV to reduce the risk of WNV transmission.

### 3.10. Cultural Resources

Class III cultural resource inventory was performed for the Cottonwood POD prior to on-the-ground project work (BFO project no. 70120011). A Class III cultural resource inventory following the Archeology and Historic Preservation, Secretary of the Interior's Standards and Guidelines (48CFR190) and the *Wyoming State Historic Preservation Office Format, Guidelines, and Standards for Class II and III Reports* was conducted by BFO. Ardeth Hahn, BLM Archaeologist, reviewed the report for technical adequacy and compliance with BLM standards, and determined it to be adequate. The following resources are located in or near the project area, Table 3.8.

**Table 3.8. Cultural Resources Inventory Results**

Site Number	Site Type	National Register Eligibility
48CA264	Bozeman Trail, West Pine Tree Segment 1	National Register listed , non-contributing
48CA264	Bozeman Trail, Ninemile Segment	National Register listed, contributing
48CA5351	Prehistoric and Historic site	Not Eligible
48CA5362	Historic Site	Not Eligible
48CA5494	Ft. Fetterman-Ft. McKinney Telegraph Line, West Pine Tree Segment 1	Eligible, non-contributing
48CA5494	Ft. Fetterman-Ft. McKinney Telegraph Line, Ninemile Segment	Eligible, contributing

Some of the project area analyzed in this EA occurs on deep alluvial deposits. Alluvial deposits typically have a high potential for buried cultural resources, which are nearly impossible to locate during a Class III inventory (Ebert & Kohler 1988:123; Eckerle 2005:43).

Site 48CA264 (Bozeman Trail) is listed on the National Register of Historic Places (NRHP) and 48CA5494 (Ft. Fetterman to Ft. McKinney Telegraph Line) is eligible for the NRHP. Contributing portions (typically expressed as wagon ruts) of each site are present in the project area. None of the contributing portions of the sites retain their integrity of setting due to modern additions to the landscape including CBNG wells, upgraded roads, pipelines, reservoirs, POD buildings, compressor stations, etc.

## **4. ENVIRONMENTAL EFFECTS**

### **4.1. Air Quality**

In the project area, air quality impacts would occur during construction (due to surface disturbance by earth-moving equipment, vehicle traffic fugitive dust, well testing, as well as drilling rig and vehicle engine exhaust) and production (including well production equipment, booster and pipeline compression engine exhaust). The amount of air pollutant emissions during construction would be controlled by watering disturbed soils, and by air pollutant emission limitations imposed by applicable air quality regulatory agencies. Air quality impacts modeled in the PRB FEIS concluded that projected oil and gas development would not violate any local, state, tribal, or federal air quality standards.

### **4.2. Soils, Vegetation and Ecological Sites**

#### **4.2.1. Soils**

##### **4.2.1.1. Direct and Indirect Effects**

The PRB FEIS analyzed direct and indirect impacts to soils associated with fluid mineral development, see p. 4-134. Impacts anticipated to occur include soil rutting and mixing, compaction, increased erosion potential, and loss of soil productivity. The most notable impacts to soils would occur in association with the construction of well pads, and roads. Construction of these facilities requires grading and leveling, with the greatest level of effort required on more steeply sloping areas.

Rutting affects the surface hydrology of a site as well as the rooting environment. The process of rutting physically severs roots and reduces the aeration and infiltration of the soil, thereby degrading the rooting environment. Rutting may result in mixing of topsoil and subsoil, thereby reducing soil productivity. Rutting also disrupts natural surface water hydrology by diverting and concentrating water flows creating accelerated erosion. During construction, the soil profiles would be mixed with a corresponding loss of soil structure. Mixing may result in removal, dilution, or relocation of organic matter and nutrients to depths where it would be unavailable for vegetative use. Less desirable inorganic compounds such as carbonates, salts, or weathered materials could be relocated and have a negative impact on re-vegetation. Soil mixing typically results in a decrease in soil fertility and a disruption of soil structure.

Soils would be compacted as a result of the construction of wells and associated facilities, with compaction maintained, at least in part, by continued vehicle and foot traffic as well as operational activities. Factors affecting compaction include soil texture, moisture, organic matter, clay content, and type, pressure exerted, and the number of passes by vehicle traffic or machinery. Compaction leads to a loss of soil structure; decreased infiltration, permeability, soil aeration; and increased runoff and erosion.

The potential for erosion would increase through the loss of vegetation cover and soil structure as compared to an undisturbed state. Increased erosion can lead to a decrease in soil fertility and an increase in sedimentation. The duration and intensity of these impacts would vary according to the type of construction activity to be completed and the inherent characteristics of the soils to be impacted.

Soil productivity would decrease, primarily as a result of profile mixing and compaction along with the loss in vegetative cover. These impacts would begin immediately as the soils would be subjected to grading and construction activities and impacts would continue for the term of operations. An important component of soils in Wyoming's semiarid rangelands, especially in the Wyoming big sagebrush cover type, are biological soil crusts, or cryptogamic soils that occupy ground area not covered with vascular plants. Biological soil crusts are important in maintaining soil stability, controlling erosion, fixing nitrogen, providing nutrients to vascular plants, increasing precipitation infiltration rates, and providing suitable seed beds (Belnap et al. 2001). They are adapted to growing in severe climates; however, they take many years to develop (20 to 100) and can be easily damaged or destroyed by surface disturbances

associated with construction activities.

*For the purpose of analysis:*

An engineered pad is needed at each of the 7 wells (4 locations) listed in Table 2.1. Proposed Wells – Alternative B to safely drill the wells on undulating topography, the amount of disturbance associated with conventional oil development, with projected cuts/fills potentially exceeding 10 feet.

The soil depth identified in the SSURGO data ranges from 10 to 80 inches deep. The predicted cut depth exceeds the identified soil depth, thus impacting C and Cr horizons which are described as “little affected by pedogenic processes”, or unaltered parent material. The physical and chemical properties of the material is variable and very limiting in its potential to support plant growth, variable in erosion potential and suitability for construction material. Thus the exposure and creation of material described as LRP areas. Suitable topsoil and subsoil material to an adequate depth is required to support desired vegetation.

The MSUP states production facilities will have cut slopes at 1.5: 1 (66.7 % slope), and fill or foreslope of 1.5: 1-2:1 (50% slope) these slopes exceed 25%. Slopes reduced to 3:1 (33% slope) need to have mitigation applied to reduce the slope or slope length to address erosion and stability issues.

Highly erosive soils due to the loss of vegetation and the physical and chemical properties encountered make the site susceptible to wind erosion. Slope length and steepness are components in defining water erosion potential thus creating a highly erosive site to wind and water erosion. Modeled erosion amounts far exceeded the soil loss tolerance factor of the soils in the area, therefore expedient stabilization is required.

#### **4.2.1.2. Cumulative Effects**

The cumulative effects associated with Alternative B are very likely inside analysis parameters and impacts described in the PRB FEIS with the approval of the project components listed in Table 4.7. For details on expected cumulative impacts, refer to the referenced PRB FEIS, Chapter 4.

The designation of the duration of disturbance is defined in the PRB FEIS (pp. 4-1 and 4-151). Most soil disturbances could be short term impacts with expedient interim reclamation and site stabilization.

#### **4.2.1.3. Mitigation Measures**

Impacts to soils and vegetation from surface disturbance will be reduced by following the BLM and DEP’s applied mitigating design features listed in Section 2, above, and:

1. Shortened time frame for application of stabilization measures; (applied 30 days from the start of construction).
2. Use the guidelines from the BLM statewide reclamation policy.
3. Use a maintenance plan established after each storm event or monthly whichever is more frequent.

#### **4.2.1.4. Residual Effects**

Residual effects across the POD would include a long-term loss of soil productivity associated with well pads and roads. The PRB FEIS identified residual effects (p. 4-408) such as the loss of vegetative cover, despite expedient reclamation, for several years until reclamation is successfully established. Due to the presence of erosive soils and the topography of the project area erosion will occur. Rilling and gullyng of cut and fill slopes on, access/utility corridors, will take place. Impacts from livestock to stabilized cut and fill slopes will limit soils becoming stable and getting vegetation establish.

The PRB FEIS defined the designation of the duration of disturbance, pp. 4-1 and 4-151. “For this EIS, short-term effects are defined as occurring during the construction and drilling/completion phases. Long-

term effects are caused by construction and operations that would remain longer”.

Impacts to vegetation and soils from surface disturbance will be reduced, by following the operator’s plans and BLM applied mitigation. Construction of new access roads has been reduced by placing the well locations such that existing oil/gas access roads are used and one existing fee mineral pad location is being used for federal mineral development. This practice results in less surface disturbance and overall environmental impacts. See Section 2.2 for summary of disturbance. All disturbances associated with the proposed action are long term. With the reclamation status of the project area being rated as fair and field observations showing areas of reclamation success expedient reclamation of disturbed land with stockpiled topsoil, proper seedbed preparation techniques, and appropriate seed mixes, along with utilization of erosion control measures (e.g., waterbars, water wings, culverts, rip-rap, etc.) would ensure land productivity/stability is regained and maximized.

#### **4.2.2. Vegetation and Ecological Sites**

##### **4.2.2.1. Direct and Indirect Effects**

The PRB FEIS discussed direct and indirect effects to vegetation, pp. 4-153 to 4-164. Direct effects to vegetation would occur from ground disturbance caused by construction of well pads, ancillary facilities, associated pipelines, and roads. Vegetated areas disturbed and reclaimed within 1 to 3 years of the initial disturbance would suffer short-term effects. Long-term effects would occur where well pads, compressor stations, roads, water-handling facilities, or other semi-permanent facilities would result in loss of vegetation and where reclamation for the life of the project. Indirect effects, as described in the PRB FEIS, would include the spread and/or establishment of noxious weeds, the alteration in surface water flows affecting vegetation communities, alteration in ecosystem biodiversity, and changes in wildlife habitat. Expediently stabilizing the disturbance through interim reclamation and the implementation of erosion control measures would mitigate these impacts.

BLM anticipates long-term impacts to sagebrush due to slow recovery rates and the duration between construction and re-disturbance during final reclamation. Complete restoration of sagebrush shrubland after disturbance can often take decades. Studies of Wyoming big sagebrush post fire recovery intervals indicated that post-fire regeneration of this species can take 50 to 120 years to regenerate naturally (Cooper et al. 2007; Baker 2006). Wyoming big sagebrush took approximately 17 years to re-establish after chemical removal in Wyoming (Johnson 1969) and sagebrush species can take 3 to 7 years to begin to spread in locations where seed drilling or transplant of seedlings occurred (Tirmenstein 1999).

##### **4.2.2.2. Cumulative Effects**

The PRB FEIS discussed cumulative effects to vegetation, pp. 4-164 and 4-172. Most surface disturbances would result in short-term impacts to grasses and forbs related to construction activities that would be reclaimed through interim reclamation and site stabilization, as committed to by the operator and as required by the BLM in COAs.

Final reclamation would disturb all sites disturbed by construction and operation activities, including those previously reclaimed during interim reclamation. Disturbance associated with final reclamation activities would alter the composition of species in reclaimed areas relative to undisturbed areas by replacing diverse native communities with communities consisting of a few favored reclamation species.

##### **4.2.2.3. Mitigation Measures**

Impacts to vegetation from surface disturbance will be reduced through the implementation of the mitigation measures found in the Cottonwood 1 POD COAs; the Cottonwood 1 Conventional POD, and its associated plans including the Integrated Weed and Pest Management Plan, the MSUP (specifically Section 10, Plans for Reclamation of the Surface); see the administrative record. BLM will consider

having DEP follow the Wyoming Policy on Reclamation (<http://www.blm.gov/style/medialib/blm/wy/programs/reclamation.Par.93230.File.dat/WyReclamationPolicy.pdf>), incorporated here by reference. Final reclamation measures will achieve this goal. BLM reclamation goals also include the short-term goal of quickly stabilizing disturbed areas to protect both disturbed and adjacent undisturbed areas from unnecessary degradation. Interim reclamation measures will achieve this short-term goal.

#### **4.2.2.4. Residual Effects**

Residual effects would include a long-term loss of soil productivity associated with well pads and roads. Residual effects were identified in the PRB FEIS, p. 4-408, such as the loss of vegetative cover, despite expedient reclamation, for several years until reclamation is successfully established.

### **4.3. Water Resources**

Adherence to the drilling COAs, the setting of casing at appropriate depths, following safe remedial procedures in the event of casing failure, and using proper cementing procedures should protect fresh water aquifers above the drilling target zone. The Fox Hills formation is anticipated to be encountered at 7600 feet, this formation is approximately 115 feet thick. To ensure the Fox Hills formations protection DEP proposes to run intermediate string. The top of cement for the intermediate string will be brought up to 5000 feet. This will place approximately 2600 feet of cement above the Fox Hills formation. If cement is not circulated to surface, a Cement Bond log with gamma ray will be run after the drilling rig has been releases to confirm cement above the Fox Hills Formation. Compliance with the drilling and completion plans and Onshore Oil and Gas Orders Nos. 2 and 7 will ensure there is no adverse impact on ground water.

DEP is planning on using CBNG produced water for drilling and completion of the proposed wells in the Cottonwood 1 POD. CBNG water historically has been consider a by-product and is now being applied as a beneficial use. DEP plans to obtain fresh water from the West Pine Tree CBM Field Fink Prong pipeline at a diversion located in the SWNW, Section 18, TNS 41N RNG 75W (SEO Permit # P196903W) or at a diversion located in the NESW Section 31, TNS 42N RNG 75W. All entities are gathering facilities for water produced from the Big George coal seam. The Fink Prong diversion is located in SWNW Section 18, Township 41 North, Range 75 West.

An analysis representative of the West Pine Tree CBNG water is shown as Attachment E of the Cottonwood 1 POD, see administrative record. DEP plans an estimated 15,000 barrels of water (approximately 10-15 truckloads per day) will be required for drilling each well and an estimated 30,000 to 50,000 barrels of water will be required to hydraulically fracture each well. The Fink Prong diversion in the SWNW Section 18, TNS 41N RNG 75W will be used to supply water for drilling of the Cottonwood 515-1SH/Cottonwood 615-4SH, the Cottonwood 815-2SH /Cottonwood 1715-3SH, and the South Cottonwood 1 POD fresh water storage pit. The Fink Prong diversion located in the NESW Section 31, Township 42 North, Range 75 West will be used to supply the Cottonwood 1925-2SH/Cottonwood 3025-1SH, the Cottonwood 3125-3SH, and the North Cottonwood I POD fresh water storage pit.

The WSEO, WDEQ, and WOGCC regulate waters and chemicals for drilling, “BLM may rely on the actions of state regulators. The IBLA and federal courts recognized it is appropriate for BLM to assume a proposed action complies with state permitting requirements, and rely on state analysis when evaluating the significance of effects. Wyo. Outdoor Council v. U.S. Army Corps of Eng'rs, 351 F. Supp. 2d 1232, 1244 (D. Wyo. 2005); PRBRC, 180 IBLA 32, 57 (2010); Bristlecone Alliance, 179 IBLA 51, 74-77 (2010).” In Wyoming Outdoor Council, the District Court held the Corps may rely on the WDEQ permitting process to “ameliorate any concerns that impacts to water quality will be significant.” Id.



#### **4.3.1. Groundwater**

##### **4.3.1.1. Direct and Indirect Effects**

With applied mitigation measures there are no reasonable/forseeable direct/indirect/cumulative or residual effects with the drilling of the proposed wells. Additionally the cumulative industry and regulatory experience shows that thousands of wells pierce the nation's largest aquifer in western Texas, Oklahoma, and Kansas with essentially no direct or indirect impact to that groundwater, see generally, <http://www.spe.org/jpt/print/archives/2010/12/10Hydraulic.pdf>. Lastly, the EPA 2004 study and its ongoing, detailed study of hydraulic fracturing yielded no immediate cautions, concerns, or warnings that present industry and regulatory practices endanger ground water or require immediate changes.

##### **4.3.1.2. Mitigation Measures**

The volume of water produced by this mineral development is unknowable at the time of permitting. DEP will have to produce the wells for a time to be able to estimate the volume and quantity of water production. To comply with Onshore Order Oil and Gas Order No. 7 Disposal of Produced Water, DEP EA, Cottonwood 1 POD EA will submit a Sundry to the BLM within 90 days of first production which includes a representative water analysis and the final proposal for water management. The quality of water produced in association with conventional oil and gas historically was such that surface discharge would not be possible without treatment. Initial water production is quite low in most cases. There are 3 common alternatives for water management: re-injection, deep disposal, or disposal into pits. All alternatives would be protective of groundwater resources when performed in compliance with state and federal regulations.

#### **4.4. Wetland/Riparian**

##### **4.4.1. Direct, Indirect, Cumulative Effects**

BLM anticipates no impacts to wetlands or riparian areas from the proposed actions. The project was designed to avoid impact to wetlands/riparian areas. The PRB FEIS read that cumulative impacts to soils could occur due to sedimentation from water erosion that could change water quality and fluvial characteristics of streams and rivers in the sub-watersheds of the POD area.

##### **4.4.2. Mitigation Measures**

DEP committed, in their MSUP, to expedient reclamation. DEP committed to 30 day stabilization after initiation of construction. Also DEP proposed to use existing resource roads where possible; where DEP requires new roads it will apply BMP standards and surfaced them with gravel.

##### **4.4.3. Residual Effects**

There will be changes to wetland and riparian areas through alterations in volume, velocity, timing, and quality of the stream flow due to direct discharge. Turbidity and solids loading in the streams would probably increase due to erosion of project disturbed areas and sediment transport to the associated drainages. DEP will mitigate these impacts by expediently stabilizing the disturbance and reducing the amount of sediment reaching the streams.

#### **4.5. Invasive Species**

##### **4.5.1. Direct and Indirect Effects**

The use of existing facilities along with the surface disturbance associated with construction of proposed access roads, pipelines, water management infrastructure, produced water discharge points, and related facilities would present opportunities for weed invasion and spread.

##### **4.5.2. Cumulative Effects**

Produced CBNG water would likely continue to modify existing soil moisture and soil chemistry regimes in the areas of water release and storage. The activities related to the performance of the proposed project

would create a favorable environment for the establishment and spread of noxious weeds/invasive plants such as salt cedar, Canada thistle, and perennial pepperweed.

#### **4.5.3. Mitigation Measures**

No further mitigation is needed due to DEP committing to the control of noxious weeds and species of concern using the following measures identified in their Integrated Pest Management Plan (IPMP):

- Control Methods include physical, biological, and chemical methods: Physical methods include mowing during the first season of establishment, prior to seed formation, and hand pulling of weeds (for small or new infestations). Biological methods include the use of domestic animals, or approved biological agents. Chemical methods include the use of herbicides, done in accordance with the existing Surface Use Agreement with the private surface owner.
- Preventive practices: Certified weed-free seed mixtures will be used for re-seeding, and vehicles and equipment will be washed before leaving areas of known noxious weed infestations.
- Education: DEP will provide periodic weed education and awareness programs for its employees and contractors through the county weed districts and federal agencies. Field employees and contractors will be notified of known noxious weeds or weeds of concern in the project area.

#### **4.5.4. Residual Effects**

Control efforts by the operator are limited to the surface disturbance associated the implementation of the project. Cheat grass and other invasive species that are present within non-physically disturbed areas of the project area are anticipated to continue to spread unless control efforts are expanded. Cheatgrass and to a lesser extent, Japanese brome (*B. japonicus*) are found in such high densities and numerous locations throughout NE Wyoming that a control program is not considered feasible at this time; these annual bromes would continue to be found within the project area.

### **4.6. Fish and Wildlife**

#### **4.6.1. Big Game**

##### **4.6.1.1. Direct and Indirect Effects**

The PRB FEIS analyzed impacts to big game, pp. 4-181 to 4-210. As discussed in that document, impacts to pronghorn and mule deer may occur through alterations in hunting and/or poaching, increased vehicle collisions, harassment and displacement, increased noise, increased dust, alterations in nutritional status and reproductive success, increased fragmentation, loss or degradation of habitats, reduction in habitat effectiveness, and declines in populations.

##### **4.6.1.2. Cumulative**

Refer to the PRB FEIS for big game cumulative impacts, p. 4-211.

##### **4.6.1.3. Mitigation Measures**

The measures described in the vegetation section to reclaim vegetation will replace some of the loss of habitat.

##### **4.6.1.4. Residual Effects**

Although some of the disturbed habitat will be replaced with interim reclamation, 35.80 acres will remain disturbed for the long term and the.

#### **4.6.2. Migratory Birds**

##### **4.6.2.1. Direct and Indirect Effects**

The PRB FEIS discussed the direct and indirect effect to migratory birds, pp. 4-231 to 4-235. Disturbance of habitat in the project area is likely to impact migratory birds. Native habitats will be lost directly with the construction of wells, roads, and pipelines. Activities (traffic, maintenance, and operations) will likely

displace migratory birds farther than the immediate area of physical disturbance. Ingelfinger (2004) identified that the density of breeding Brewer's sparrows declined by 36% and breeding sage sparrows declined by 57% within 100 m of dirt roads in a natural gas field. Effects occurred along roads with light traffic volume (less than 12 vehicles per day). The increasing density of roads constructed in developing natural gas fields exacerbated the problem creating substantial areas of impact where indirect habitat losses through displacement were much greater than the direct physical habitat losses.

#### **4.6.2.2. Cumulative Effects**

The cumulative effects associated with alternative B are within the analysis parameters and impacts described in the PRB FEIS. Refer to the PRB FEIS, p. 4-235, for details on expected cumulative impacts.

#### **4.6.2.3. Mitigation Measures**

BLM proposes no timing limitations on surface disturbing activities specifically for migratory birds. However, raptor and sage-grouse timing limitations on surface disturbing activities will also serve to mitigate impacts to nesting migratory birds. A COA will be attached to the project to ensure that migratory birds are excluded from all facilities that pose a mortality risk, including, but not limited to, heater treaters, flare stacks, and secondary containment where escape may be difficult or hydrocarbons or toxic substances are present.

#### **4.6.2.4. Residual Effects**

Though no timing restrictions are typically applied specifically to protect migratory bird breeding or nesting, where BLM applies sage-grouse or raptors nesting timing limitations, nesting migratory birds receive protection. Where these timing limitations are not applied and migratory bird species are nesting, migratory birds remain vulnerable. Sage-grouse timing limitations will apply to a portion of this project. Those migratory bird species and individuals that are still nesting when the sage-grouse timing limitations are over (June 30) may have nests destroyed, or be disturbed, by construction activities. Protections around active raptor nests (Feb 1- July 31) extend past most migratory bird nesting seasons. Only a percentage of known nests are active any given year, so the protections for migratory birds from June 30 - July 31 will depend on how many raptor nests are active. Reclamation and other activities that occur in the spring may be detrimental to migratory bird survival. Prompt re-vegetation of short-term disturbance areas should reduce habitat loss impacts.

### **4.6.3. Raptors**

#### **4.6.3.1. Direct and Indirect Effects**

The PRB FEIS analyzed direct and indirect effects to raptors, pp. 4-216 to 4-221. This project will result in disturbance in proximity of nesting raptors, including direct loss of foraging habitats and indirect losses associated with declines in habitat effectiveness. All raptors using nests in the vicinity of the project will likely be impacted to some extent by the human disturbance associated with operation and maintenance.

The location for Cottonwood wells 1925-2SH and 3025-1SH are within 0.5 of two ferruginous hawk nests (4637 and 4683). Nest 4637 is approximately 0.45 miles from the well location and has been inactive in all years recorded, 2006 – 2011. Nest 4683 is 0.50 miles away and was last recorded as active in 2007. The Cottonwood 3125-3SH well location is within 0.5 miles of 5 raptor nests. Four of the nests are ferruginous hawk nests. Of these, nest 4626, which is approximately 0.41 miles from the well, was occupied in 2006. The other ferruginous nests have not been reported as active in surveys that go back to 2006. The closest nest to the well is nest 4841, at 0.25 miles. The 12682 nest was active in 2011, being occupied by American kestrels. The 3125-3SH well is a sufficient enough distance to the nest, given the species, that kestrels should not be precluded from using the nest site in the future.

The location for the Cottonwood 615-4SH/515-1SH wells is approximately 0.25 miles from nests 4436,

4422, and 11227 (active red-tailed hawk 2011). The distance from the well to the nest should be enough that red-tailed hawks will use the nest in the future.

Human activities in close proximity to active raptor nests may interfere with nest productivity. Romin and Muck (1999) indicate that activities within 0.5 miles of a nest are prone to cause adverse impacts to nesting raptors. If disruptive activities occur during nesting, they could be sufficient to cause adult birds to remain away from eggs or chicks causing overheating or chilling. This can result in egg or chick death. Prolonged disturbance can also lead to the abandonment of the nest by the adults. Routine human activities near these nests can also draw increased predator activity to the area and resulting in increased nest predation. The FWS recommends a 1 mile buffer for ferruginous hawks, however the BLM Buffalo Field Office RMP allocates 0.5 mile. To reduce the risk of decreased productivity or nest failure, the BLM BFO requires a 0.5 mile radius timing limitation during the breeding season around active raptor nests and recommends all infrastructures requiring human visitation be located to provide adequate biologic buffer for nesting raptors. A biologic buffer is a combination of distance and visual screening that provides nesting raptors with security such that they will not be flushed by routine activities. The BLM and operator worked to reduce impacts to raptors from well Cottonwood 3125-3SH by moving it approximately 100 feet north out of direct line sight of nest 4841.

#### **4.6.3.2. Cumulative Effects**

The cumulative effects associated with Alternative B are within the analysis parameters and impacts described in the PRB FEIS. Refer to the PRB FEIS for details on expected cumulative impacts, p. 4-221.

#### **4.6.3.3. Mitigation Measures**

To protect raptor nests within 0.5 mile, the BLM BFO will require timing limitations during the breeding season on Cottonwood well locations 1925-2SH/3025-1SH, 3125-3SH, and 615-4SH/515-1SH.

#### **4.6.3.4. Residual Impacts**

Even with timing restrictions, raptors may abandon nests due to foraging habitat alteration associated with development or sensitivity to well or infrastructure placement. Declines in breeding populations of some species that are more sensitive to human activities may occur.

### **4.6.4. Wildlife Threatened, Endangered, Proposed and Candidate Species**

#### **4.6.4.1. Threatened and Endangered Species**

##### **4.6.4.1.1. Ute Ladies'-Tresses Orchid (ULT)**

Based on the last species list for the Buffalo Field Office, dated July 22, 2011, the Ute Ladies'-tresses Orchid is the only listed species requiring an effects determination (ESA Section 7 (2)).

##### **4.6.4.1.1.1. Direct and Indirect Effects**

Because project components will be constructed in upland Suitable sites, habitat is not present in the project area and implementation of the proposed project will have "no effect" on ULT.

##### **4.6.4.1.1.2. Cumulative Effects**

The PRB FEIS discussed the cumulative effects to ULT, pp. 4-253 to 4-254).

##### **4.6.4.1.1.3. Mitigation Measures**

BLM proposes no mitigation with Alternative B.

##### **4.6.4.1.1.4. Residual Effects**

BLM anticipates no residual effects.

#### **4.6.5. Candidate Species**

##### **4.6.5.1. Greater Sage-Grouse (GSG)**

###### **4.6.5.1.1. Direct and Indirect Effects**

Implementation of the proposed project will impact GSG habitat and individuals. Impacts to GSG are generally a result of loss and fragmentation of sagebrush habitats associated with roads and infrastructure. The *12-Month Findings for Petitions to List the Greater Sage-Grouse (Centrocercus urophasianus) as Threatened or Endangered* (FWS 2010) and chapters 15-21 of *Greater Sage-grouse Ecology and Conservation of a Landscape Species and its Habitats* (Knick and Connelly 2011) – both discuss impacts to GSG associated with energy development in detail. Implementation of the project will adversely impact nesting habitat, both through direct loss and avoidance of the area by GSG. Implementation of the proposed project will cause sagebrush habitat removal and functional loss of habitat from fragmentation and anthropogenic activity of approximately 35.80 acres during interim/production. The PRB FEIS discussed direct and indirect impacts to sage-grouse in more detail, pp. 4-257 to 4-273.

###### **4.6.5.1.2. Cumulative Effects**

There are currently 690 existing wells (WOGCC, May 24, 2012) in the cumulative impact assessment area, an area of 169 square miles, which amounts to a density of approximately 4.1 wells per square mile. Currently, there are approximately 513 proposed wells (AFMSS, May 24, 2012) (including the 4 from this project) within 4 miles of the 9 leks. With the addition of the proposed wells, the well density within 4 miles of the leks increases to 7.1 wells per square mile, well above the 1 well per square mile recommendation made by the State Wildlife Agencies' Ad Hoc Committee for Sage-Grouse and Oil and Gas Development.

The 2012 BLM-contracted population viability analysis for the Northeast Wyoming sage-grouse found there remains a viable population of GSG in the PRB (Taylor et al. 2012). Threats from energy development and West Nile Virus (WNV) are impacting future viability (Taylor et al. 2012). The study indicated that effects from energy development, as measured by male lek attendance, are discernible out to a distance of 12.4 miles. There are 28 leks that would be affected by this project.

Studies document the additive impacts of energy development and WNV as a threat to GSG persistence in the PRB (Taylor et al. 2012, Garton et al. 2011). The cumulative and synergistic effects of CBNG development and WNV in the PRB area will continue to impact the local GSG population, causing further declines in lek attendance, and could result in local extirpation: “[f]indings reflect the status of a small remaining GSG population that has already experienced an 82% decline within the expansive energy fields (Walker et al. 2007a), a level of impact that has severely reduced options for delineating core areas that are large enough and in high enough quality habitats to sustain populations.” (Taylor et al. 2012).

Current well densities reduced the function of PRB core areas, affecting all of the remaining active leks within core (Taylor et al. 2012). Continued energy development around the core areas will continue to impact their remaining value. Declines in active leks and male attendance indicate that the WNV outbreaks and energy development reduce GSG populations and that they interact to exacerbate population declines. The effects of one WNV outbreak year could cut a population in half. Absent a WNV outbreak, or another stochastic event of similar magnitude, immediate extirpation is unlikely. Results suggest that if current oil and gas development rates continue, they may compromise future viability of NE Wyoming GSG, with an increased chance of extirpation with additional WNV outbreaks (Taylor et al. 2012).

###### **4.6.5.1.3. Mitigation Effects**

To protect nesting and brood rearing GSG, BLM will implement a timing limitation (1 March to 15 June) on all surface-disturbing activities in quality nesting habitat within the proposed project.

The intent of this timing restriction is to decrease the likelihood that GSG will avoid these areas and increase habitat quality by reducing noise and human activities during the breeding season.

#### **4.6.5.1.4. Residual Effects**

A timing limitation does nothing to mitigate loss and fragmentation of habitat or changes in disease mechanisms. Suitability of the project area for sage-grouse will be negatively affected due to habitat loss and fragmentation and proximity of human activities associated with fluid mineral development.

#### **4.6.6. Special Status (Sensitive) Species (SSS)**

BLM will take necessary actions to meet the policies set forth in SSS policy (BLM Manual 6840). BLM Manual 6840.22A states that “The BLM should obtain and use the best available information deemed necessary to evaluate the status of special status species in areas affected by land use plans or other proposed actions and to develop sound conservation practices. Implementation-level planning should consider all site-specific methods and procedures which are needed to bring the species and their habitats to the condition under which the provisions of the ESA are not necessary, current listings under special status species categories are no longer necessary, and future listings under special status species categories would not be necessary.” The PRB FEIS discusses impacts to sensitive species on pp. 4-257 to 4-265. The effects to sensitive species resulting from implementation of the project are in Table A.1 in Appendix A.

### **4.7. Aquatics**

#### **4.7.1. Direct and Indirect Effects**

Because the project actions are in upland sites, no aquatic habitat should be impacted.

#### **4.7.2. Cumulative Effects**

Refer to the PRB FEIS, pp. 4-235 to 4-246 for general details on expected cumulative impacts.

#### **4.7.3. Mitigation Measures**

BLM proposes no mitigation with Alternative B.

#### **4.7.4. Residual Effects**

BLM anticipates no residual impacts.

### **4.8. West Nile Virus**

#### **4.8.1. Direct and Indirect Effects**

This project is likely to result in standing surface water which may increase mosquito breeding habitat.

#### **4.8.2. Cumulative Effects**

There are many sources of native standing water throughout the PRB that add mosquito habitat. Summer thunderstorms, that pool water for more than 4 days in hot weather, can result in large Culex mosquito hatches. Other sources of water include; natural flows, livestock watering facilities, coal mining operations, and human outdoor water use and features in and around communities.

#### **4.8.3. Mitigation Measures**

There is little evidence that treatment, either through the use of larvicides or malathion, on a site specific or basin-wide scale will have any effect on the overall spread of the disease; however, one study showed that landscape level larvicide applications can decrease the number of hatching mosquitoes in an area (BHEC 2008).

## **4.9. Cultural Resources**

### **4.9.1. Direct and Indirect Effect**

Non eligible sites 48CA5351 and 48CA5362 and non-contributing portions 48CA264 (Bozeman Trail) and 48CA5494 (Ft. Fetterman to Ft. McKinney Telegraph Line) will be impacted by the proposed project. No contributing portions of eligible sites 48CA264 (Bozeman Trail) or 48CA5494 (Ft. Fetterman to Ft. McKinney Telegraph Line) will be physically impacted. None of the historic properties within the project area retain their integrity of setting. The proposed project will not diminish any other aspects of integrity of the historic properties. Following the Wyoming State Protocol Section VI(B)(1) the BLM determined that the project will result in “No Adverse Effect”. The Wyoming SHPO concurred with the Bureau’s determination on June 4, 2012.

### **4.9.2. Cumulative Effects**

Construction and development of oil and gas resources impacts cultural resources through ground disturbance, unauthorized collection, and visual intrusion of the setting of historic properties. This results in fewer archaeological resources available for study of past human life-ways, changes in human behavior through time, and interpreting the past to the public. Additionally, these impacts may compromise the aspects of integrity that make a historic property eligible for the National Register of Historic Places. Recording and archiving basic information about archaeological sites and the potential for subsurface cultural materials in the proposed project area serve to partially mitigate potential cumulative effects to cultural resources.

Fee actions constructed in support of federal actions can result in impacts to historic properties. Construction of large plans of CBNG development on split estate often include associated infrastructure that is not permitted through BLM. Project applicants may connect wells draining fee minerals, or previously constructed pipelines on fee surface with a federal plan of development. BLM has no authority over such development which can impact historic properties. BLM has the authority to modify or deny approval of federal undertakings on private surface, but that authority is limited to the extent of the federal approval. Historic properties on private surface belong to the surface owner and they are not obligated to preserve or protect them. The BLM may go to great lengths to protect a site on private surface from a federal undertaking, but the same site can be legally impacted by the landowner at any time. The cumulative effect of numerous federal approvals can result in impacts to historic properties. Archeological inventories reveal the location of sites and although the BLM goes to great lengths to protect site location data, information can potentially get into the wrong hands. BLM authorizations that result in new access can inadvertently lead to impacts to sites from increased visitation by the public.

### **4.9.3. Mitigation Measures**

If any cultural values [sites, artifacts, human remains (Appendix L PRB FEIS and ROD)] are observed during operation of this lease/permit/right-of-way, they will be left intact and the Buffalo Field Manager notified. Further discovery procedures are explained in the Standard COA (General)(A)(1).

When a project is constructed in an area with a high potential for buried cultural material, archaeological monitoring is often included as a condition of approval. Construction monitoring is performed by a qualified archeologist working in unison with construction crews. If buried cultural resources are located by the archeologist, construction is halted and the BLM consults with the SHPO on mitigation or avoidance. Due to the presence of alluvial and/or Aeolian deposits identified by the NRCS soil survey (NRCS n.d.) the operator will be required to have an archeologist monitor all earth moving activities associated with certain construction, as described in the site specific COAs.

### **4.9.4. Residual Effects**

During the construction phase, there will be numerous crews working across the project area using heavy

construction equipment without the presence of archaeological monitors. Due to the extent of work and the surface disturbance caused by large vehicles, it is possible that unidentified cultural resources can be damaged by construction activities. The increased human presence associated with the construction phase can also lead to unauthorized collection of artifacts or vandalism of historic properties.

## 5. CONSULTATION/COORDINATION:

**BLM consulted or coordinated with the following on this project:**

Contact	Organization	Onsite Presence?
Mary Hopkins, Wyoming State Historic Preservation Officer	Wyoming SHPO	No
Laura Nowlin, Historian, Review & Federal Consultation	Wyoming SHPO	No
Brad Rogers, Wildlife Biologist	FWS	Yes

**List of Preparers (BFO unless otherwise noted)**

Position/Organization	Name	Position/Organization	Name
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LIE	Sharon Soule	Grazing Management	Janelle Gonzalez
Soils	Arnie Irwin	Assistant Field Manager	Chris Durham
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## 6. References and Authorities

- Agnew, W. D. 1983. Flora and Fauna Associated with Prairie Dog Ecosystems. Unpublished thesis. Colorado State University, Fort Collins. 47pp.
- Agnew, W. D. 1988. Arthropod Consumption by Small Mammals on Prairie Dog Colonies and Adjacent Ungrazed Mixed-grass Prairie in Western South Dakota. Eighth Great Plains Wildlife Damage Control Workshop Proceedings. USDA Forest Service General Technical Report RM 154. pp. 81-87.
- Agnew, W., D. W. Uresk. and R. M. Mansen. 1986. Flora and Fauna Associated with Prairie Dog Colonies and Adjacent Ungrazed Mixed-grass Prairie in Western South Dakota. Journal of Range Management 39, pp. 135-139
- AHPIS, Animal and Plant Health Inspection Service. 2002. General information available online at <http://www.aphis.usda.gov/lpa/issues/wnv/wnv.html>.
- Aldridge, C. L., and M. S. Boyce. 2007. Linking occurrence and fitness to persistence: a habitat-based approach for endangered greater sage-grouse. Ecological Applications 17:508-526.
- Apa, A. D. 1985. Efficiency of Two Black-tailed Prairie Dog Rodenticides and Their Impacts on Non-target Bird Species. Unpublished thesis, South Dakota State University Brookings. 71pp.
- Avian Power Line Interaction Committee (APLIC) 2006. R. Harness, contributing author to: Suggested Practices for Avian Protection on Power Lines: State of the Art in 2006. 207pp.
- Bills, Thomas E. 2004. Powder River Basin Oil & Gas Project Semi-Annual Report: May 1, 2003 – October 31, 2003. BLM Buffalo Field Office. Buffalo, WY. 8pp.



- Big Horn Environmental Consultants. 2008. Powder Valley Unit – Delta POD Wildlife Survey and Habitat Report. Sheridan, WY. 11pp.
- Braun C. E. 1998. Sage-grouse declines in western North America: what are the problems? Proceedings of the Western Association of State Fish and Wildlife Agencies. 67:134–144.
- Braun C. E., M. F. Baker, R. L. Eng, J. S. Gashwiler, and M. H. Schroeder. 1976. Conservation committee report on effects of alteration of sagebrush communities on the associated avifauna. Wilson Bulletin. 88:165–171.
- Braun, C.E., O.O. Oedekoven, and C.L. Aldridge. 2002. Oil and Gas Development in Western North America: Effects on Sagebrush Steppe Avifauna with Particular Emphasis on Sage Grouse. In: Transactions of the 67<sup>th</sup> North American Wildlife & Natural Resources Conference. pp. 337-349.
- Bureau of Land Management. 2004. Instruction Memorandum No. WY-2005-057: Statement of Policy Regarding Sage-Grouse Management Definitions, and Use of Protective Stipulations, and Conditions of Approval. Bureau of Land Management, Wyoming State Office. Cheyenne, WY.
- Bureau of Land Management. 2008. Fact Sheet Greater Sage-Grouse Buffalo Field Office RMP Amendment. May 28, 2008.
- Bureau of Land Management. 1990. Instruction Memorandum No. WY-90-564: Resource Management Plan Action and Wyoming BLM Standard Mitigation Guidelines for Surface Disturbing Activities. Bureau of Land Management, Wyoming State Office. Cheyenne, WY.
- Campbell, Thomas and Tim Clark. 1981. Colony Characteristics and Vertebrate Associates of White-tailed and Black-tailed Prairie Dogs. American Midland Naturalist, Vol. 105, No. 2 (April 1981). pp. 269-276.
- Canfield, J. E., L. J. Lyon, J. M. Hillis, and M. J. Thompson. 1999. Ungulates. Chapter 6 in Effects of Recreation on Rocky Mountain Wildlife: A Review for Montana, coordinated by G. Joslin and H. Youmans. Committee on Effects of Recreation on Wildlife, Montana Chapter of The Wildlife Society.
- Clark, L., J. Hall, R. McLean, M. Dunbar, K. Klenk, R. Bowen, and C. A. Smeraski. 2006. Susceptibility of greater sage-grouse to experimental infection with West Nile virus. Journal of Wildlife Diseases 42:14-22.
- Clark, T. W., T. M. Campbell, D. G. Socha, and D. E. Casey. 1982. Prairie Dog Colony attributes and Associated Vertebrate Species. Great Basin Naturalist 42: 572-582.
- Code of Federal Regulations (CFR)
1. 40 CFR All Parts and Sections inclusive Protection of Environment. Revised as of July 1, 2004.
  2. 43 CFR All Parts and Sections inclusive - Public Lands: Interior. Revised as of October 1, 2006.
- Confluence Consulting, Inc. 2004. Powder River Biological Survey and Implications for Coalbed Methane Development. Bozeman, MT. 179 pp.
- Connelly, J. W., M. A. Schroeder, A. R. Sands, and C. E. Braun. 2000. Guidelines for management of sage grouse populations and habitats. Wildlife Society Bulletin 28:967-985.
- Connelly, J. W., S. T. Knick, M. A. Schroeder, and S. J. Stiver. 2004. Conservation Assessment of Greater Sage-grouse and Sagebrush Habitats. Western Association of Fish and Wildlife Agencies. Unpublished Report. Cheyenne, Wyoming.
- Cornish, Todd; Terry Creekmore; Walter Cook; and Elizabeth Williams. 2003. "West Nile Virus - Wildlife Mortality in Wyoming 2002-2003". In: The Wildlife Society Wyoming Chapter Program and Abstracts for the Annual Meeting at the Inn in Lander, WY November 18-21, 2003. Wildlife Society Wyoming Chapter. 17 pp.

- Cornish, Todd. Personal Communication. 2004. Wyoming State Veterinary Laboratory, University of Wyoming. Laramie, WY. (307) 742-6638. tcornish@uwyo.edu.
- Dantzker, M. S., Deane, G. B. & Bradbury, J. W. 1999. Directional acoustic radiation in the strut display of male sage grouse *Centrocercus urophasianus*. Journal of Experimental Biology, 202, 2893–2909.
- Danvir, Rick E. 2002. Sage Grouse Ecology and Management in Northern Utah Sagebrush-Steppe: A Deseret Land and Livestock Wildlife Research Report. Deseret Land and Livestock Ranch and the Utah Foundation for Quality Resource Management. Woodruff, UT.
- Deisch, M. S., D. W. Uresk, and R. L. Linder. 1989. Effects of Two Prairie Dog Rodenticides on Ground Dwelling Invertebrates in Western South Dakota. Ninth Great Plains Wildlife Damage Control Workshop Proceedings. USDA Forest Service General Technical Report RM. Pgs 171-181.
- Dobkin D. S. 1994. *Conservation and management of Neotropical migrant landbirds in the northern Rockies and Great Plains*. University of Idaho Press, Moscow, ID.
- Doherty, K.E., D.E. Naugle, B.L. Walker, J.M. Graham. 2008. Greater sage-grouse winter habitat selection and energy development. Journal of Wildlife Management. In press.
- Ebert, Jamies I., and Timothy A. Kohler. 1988. The Theoretical Basis of Archaeological Predictive Modeling and a Consideration of Appropriate Data-Collection Methods, in *Quantifying the Present and Predicting the Past: Theory, Method, and Application of Archaeological Predictive Modeling* edited by W. James Judge and Lynne Sebastian, pp 97-171. U.S. Department of the Interior, Bureau of Land Management Service Center, Denver, CO.
- Eckerle, William. 2005. Experimental: Archaeological Burial Model for Powder River and Tongue River Hydrological Basins, Wyoming. In *Adaptive Management and Planning Models for Cultural Resource in Oil and Gas Fields in New Mexico and Wyoming*, by Eric Ingbar, Lynne Sebastian, Jeffrey Altschul, Mary Hopkins, William Eckerle, Peggy Robinson, Judson Finley, Stephen A. Hall, William E. Hayden, Chris M. Rohe, Tim Seaman, Sasha Taddie, and Scott Thompson, pp. 39-102. Prepared for the Department of Energy, National Energy Technology Laboratory by Gnomon, Inc. Electronic Document, <http://www.gnomon.com/DOEPumpIII/FinalCombinedReport.pdf>, accessed August and September 2010.
- Fahrig, L., and J. Paloheimo. 1988. Determinations of local population size in patchy habitats. Theoretical Population Biology 34:194-213.
- Fertig, W. 2000. *Status Review of the Ute Ladies Tresses (*Spiranthes diluvialis*) in Wyoming*. Wyoming Natural Diversity Database, Laramie, Wyoming.
- Garton, E.O., J.W. Connelly, C.A. Hagen, J.S. Horne, A. Moser, and M.A. Schroeder. 2011. Greater Sage-grouse Population Dynamics and Probability of Persistence. Pages 293-381 in Greater sage-grouse: ecology and conservation of a landscape species and its habitats, S. T. Knick, J. W. Connelly, C. E. Braun (editors). Studies in Avian Biology, Number 38, University of California Press, Berkeley, CA, USA.
- Geist, V. 1978. Behavior. Big Game of North America; ecology and management. Stackpole Books, Harrisburg, Pennsylvania.
- Gelbard J. L., and J. Belnap. 2003. Roads as conduits for exotic plant invasions in a semiarid landscape. Conservation Biology. 17:420–432.
- Gibson, R. M. 1989. Field playback of male display attracts females in lek breeding Sage Grouse. Behavioral Ecology and Sociobiology 24: 439-443.

- Gibson, R. M. and J. W. Bradbury. 1986. *Male and female mating strategies on sage grouse leks*. Pp. 379-398 in *Ecological aspects of social evolution: birds and mammals* (D. I. Rubenstein and R. W. Wrangham, eds.). Princeton Univ. Press, Princeton, New Jersey.
- Grenier, M., B. Oakleaf, K. Taylor, and M. Hymas. 2004. *Inventory and Mapping of Black tailed Prairie Dogs in Wyoming – An Estimate of Acreage Completion Report*.
- Grenier, M. 2003. An Evaluation of Black-footed Ferret Block Clearances in Wyoming: Completion Report. Wyoming Game and Fish Department. Lander, WY. 16 pp.
- Haug, E. A. and L. W. Oliphant. 1985. Movements, Activity Patterns, and Habitat Use of Burrowing Owls in Saskatchewan. Journal of Wildlife Management. 54(1):27-35.
- Hazlett, D.L. 1996. *The discovery of *Spiranthes diluvialis* along the Niobrara River in Wyoming and Nebraska*. Report prepared for the Bureau of Land Management Wyoming State Office.
- Hazlett, D.L. 1997. *A 1997 search for *Spiranthes diluvialis* in southeastern Wyoming and western Nebraska*. Report prepared for the Bureau of Land Management Wyoming State Office.
- Heidel, Bonnie. Botanist. Wyoming Natural Diversity Database. University of Wyoming. Laramie, WY.
- Hiat, G.S. and D. Baker. 1981. Effects of oil/gas drilling on elk and mule deer winter distributions on Crooks Mountain, Wyoming. Wyoming Game and Fish Department.
- Holloran, M. J. 2005. Greater sage-grouse (*Centrocercus urophasianus*) population response to natural gas field development in western Wyoming. Dissertation, University of Wyoming, Laramie.
- Holloran, M. J., and S. H. Anderson. 2005. Spatial distribution of Greater Sage-Grouse nests in relatively contiguous sagebrush habitats. Condor 107:742-752.
- Holloran, M. J.; B. J. Heath; A. G. Lyon; S. J. Slater; J. L. Kuppier; and S. H. Anderson. 2005. Greater sage-grouse nesting habitat selection and success in Wyoming. J. Wildl. Manage. 69(2):638-649.
- Holloran, M. J., R. C. Kaiser, and W. A. Hubert. 2007. Population Response of yearling greater sage-grouse to the infrastructure of natural gas fields in southwestern Wyoming. Completion report. Wyoming Cooperative Fish and Wildlife Research Unit, Laramie, WY, USA. 34pp.
- Hoogland, J. 1995. *The black-tailed prairie dog: Social life of a burrowing mammal*. Chicago: Chicago University Press.
- Hubert, W. A. 1993. *The Powder River: a relatively pristine stream on the Great Plains*. Pages 387-395 in L. W. Hesse, C. B. Stalnaker, N. G. Benson, and J. R. Zuboy, editors. Restoration planning for the rivers of the Mississippi River ecosystem. Biological Report 19, National Biological Survey, Washington, D.C.
- ICF International. 2011. Cottonwood I Plan of Development Habitat Assessments and Biological Surveys prepared for Devon Energy Corporation. ICF International, Gillette, WY. 13pp.
- Ingelfinger, F., and S. Anderson. 2004. Passerine response to roads associated with natural gas extraction in a sagebrush steppe habitat. Western North American Naturalist 64:385-395
- Ingelfinger F. 2001. *The effects of natural gas development on sagebrush steppe passerines in Sublette County, Wyoming*. M.Sc. thesis, University of Wyoming, Laramie, WY.
- Jalkotzy, M.G., P.I. Ross, and M.D. Nasserden. 1997. The Effects of Linear Developments on Wildlife: A Review of Selected Scientific Literature. Arc Wildlife Services Ltd., Calgary, Alberta, Canada.

- Jellison, Bert. 2005. Sage-Grouse Restoration Project: Lake DeSmet Conservation District. Wyoming Game and Fish Department. Sheridan, WY.
- Kreckel, Ken. 2007. Direction Drilling: The Key to Smart Growth of Oil and Gas Development in the Rocky Mountain Region. The Wilderness Society, <http://wilderness.org/files/Directional-Drilling.pdf>.
- Kelly Brian T. 2004. Letter to interested parties: Black-footed ferret clearance surveys. U.S. Fish and Wildlife Service (February 2, 2004). Cheyenne, WY. 4pp.
- King, J. A. 1955. Social Behavior, Social Organization and Population Dynamics in a Black-tailed Prairie Dog Town in the Black Hills of South Dakota. Contr. Lab. Vert. Biol., University of Michigan. 67pp.
- Klute, D. S., L.W. Ayers, M.T. Green, W.H. Howe, S.L. Jones, J.A. Shaffer, S.R. Sheffield, and T.S. Zimmerman. 2003. *Status Assessment and Conservation Plan for the Western Burrowing Owl in the United States*. U.S. Department of the Interior; Fish and Wildlife Service, Biological Technical Publication FWS/BTP-R6001-2003, Washington, D.C.
- Knick, S. T., and J. T. Rotenberry. 1995. Landscape characteristics of fragmented shrubsteppe habitats and breeding passerine birds. Conservation Biology 9:1059-1071.
- Knick S. T., D. S. Dobkin, J. T. Rotenberry, M. A. Schroeder, W. M. Vander Haegen, and C. van Riper III. 2003. Teetering on the edge or too late? Conservation and research issues for avifauna of sagebrush habitats. Condor. 105:611-634.
- Knick, S.T., J. W. Connelly, and C. E. Braun (editors). 2011. Greater sage-grouse: ecology and conservation of a landscape species and its habitats. Studies in Avian Biology, Number 38, University of California Press, Berkeley, CA, USA.
- Knight R. L., and J. Y. Kawashima. 1993. Responses of raven and Red-tailed Hawk populations to linear right-of-ways. Journal of Wildlife Management. 57:266-271.
- Knopf F.L. and J.R Rupert. 1995. Habits and habitats of Mountain Plovers in California. Condor 97:743-751.
- Landry, R.E. 1979. *Growth and development of the Burrowing Owl*. M.S. thesis, California State University, Long Beach, CA.
- Lowham, H.W. Streamflows in Wyoming WRIR 88-4045 U.S. Geological Survey 1988.
- Lustig, Thomas D., March. 2003. Where Would You Like the Holes Drilled into Your Crucial Winter Range? Transactions of the 67<sup>th</sup> North American Wildlife and Natural Resources Conference.
- Marra PP, Griffing SM, McLean RG. West Nile virus and wildlife health. Emerg Infect Dis [serial online] 2003 Jul. Available from: URL: <http://www.cdc.gov/ncidod/vol9no7/03-0277.htm>.
- McCraken, J. G., D. W. Uresk and R. M. Mansen. 1985. Burrowing Owl Foods in Conata Basin, South Dakota. Great Basin Naturalist 45: 287-290.
- McDonald, D., N.M. Korfanta, and S.J. Lantz. 2004. *The Burrowing Owl (Athene cunicularia): a technical conservation assessment*. USDA Forest Service, Rocky Mountain Region.
- Meffe, G.K. and C.R. Carroll. 1994. *Principles of Conservation Biology*. Sinauer Associates, Inc. Sunderland, MA.
- Miller, B.K., G. Ceballos, and R.P. Reading. 1994. "The Prairie Dog and Biotic Diversity." Conservation Biology 8(3):677-81.

- Miller, K.A Peak-Flow Characteristics of Wyoming Streams WRIR 03-4107 U.S. Geological Survey 2003.
- Moynahan, B. J. and M. S. Lindberg. 2004. *Nest Locations of Greater Sage-Grouse in Relation to Leks in North-Central Montana. Presented at Montana Sage-Grouse Workshop*, Montana Chapter of The Wildlife Society, Billings.
- Moynahan, B. J.; M. S. Lindberg; J. J. Rotella; and J. W. Thomas. 2005. Factors Affecting Nest Survival of Greater Sage-Grouse in Northcentral Montana. J. Wildl. Manage.
- Moynahan, B. J., M. S. Lindberg, J. J. Rotella, and J. W. Thomas. 2007. Factors affecting nest survival of greater sage-grouse in north-central Montana. *Journal of Wildlife Management* 71:1773-1783.
- Naugle, D. E. K. E. Doherty, B. L. Walker, M. J. Holloran, and H. E. Copeland. 2011. Energy Development and Greater Sage-Grouse. Pp. 489-529 in *Greater Sage-Grouse: ecology and conservation of a landscape species and its habitats*, S. T. Knick, J. W. Connelly, C. E. Braun (eds.) *Studies in Avian Biology*, Number 38, University of California Press, Berkley.
- Naugle, D. E.; C. L. Aldridge; B. L. Walker; T. E. Cornish; B. J. Moynahan; M. J. Holloran; K. Brown; G. D. Johnson; E. T. Schmidtman; R. T. Mayer; C. Y. Kato; M. R. Matchett; T. J. Christiansen; W. E. Cook; T. Creekmore; R. D. Falise; E. T. Rinkes; and M. S. Boyce. 2004. West Nile virus: Pending Crisis of Greater Sage-grouse. *Ecology Letters*. 7:704-713.
- Naugle, David E.; Brett L. Walker; and Kevin E. Doherty. 2006. Sage Grouse Population Response to Coal-bed Natural Gas Development in the Powder River Basin: Interim Progress Report on Region-wide Lek Analyses. May 26, 2006. University of Montana. Missoula, MT. 10pp
- Nicholoff, S.H., compiler. 2003. Wyoming Bird Conservation Plan, Version 2.0. Wyoming Partners in Flight. Wyoming Game and Fish Department, Lander.
- North Dakota Industrial Commission Oil and Gas Research Program. 2011. Investigation of Methodologies to Control Dust on County Roads in Western North Dakota. Grant Applicants: Dunn and Mckenzie County.
- Noss, R. F. and A. Cooperrider. 1994. *Saving Nature's Legacy: Protecting and Restoring Biodiversity*. Defenders of Wildlife and Island Press, Washington, D. C.
- NRCS Web Soil Survey. n.d. Electronic document, <http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx>
- Oakleaf, Bob. January 13, 1988. Letter to BFAT: Preliminary BFF Reintroduction Site Analysis, Meeteetse Management Plan Assignments. Wyoming Game and Fish Department. Lander, WY. 10pp.
- Olendorff, R.R. 1993. Status, Biology, and Management of Ferruginous Hawks: A review. *Raptor Res. and Tech.* Asst. Cen., Spec. Rep. USDI, BLM, Biose, ID.
- Olenick, B. E. 1990. *Breeding biology of burrowing owls using artificial nest burrows in southeastern Idaho*. Thesis, Idaho State University, Pocatello, Idaho, USA.
- Paige, C., and S. A. Ritter. 1999. *Birds in a sagebrush sea: managing sagebrush habitats for bird communities*. Partners in Western Flight working group, Boise, ID.
- Patterson, C. T. and S. H. Anderson. 1985. Distributions of Eagles and a Survey for Habitat Characteristics of Communal Roosts of Bald Eagles (*Haliaeetus leucocephalus*) Wintering in Northeastern Wyoming. Wyoming Cooperative Fishery and Wildlife Research Unit. University of Wyoming. Laramie, WY.
- Porneluzi, P, J. C. Bednarz, L. J. Goodrich, N. Zawada, and J. Hoover. 1993. Reproductive performance of territorial Ovenbirds occupying forest fragments and a contiguous forest in Pennsylvania. *Conservation Biology* 7:618-622.

- Primack, R.B. 1993. Essentials of conservation biology. Sinauer Associates, Sunderland, Massachusetts, USA.
- Reading, R. P., S. R. Beissinger, J. J. Grensten, and T. W. Clark. 1989. Attributes of Black-tailed Prairie Dog Colonies in North Central Montana with Management Recommendations for the Conservation of Biodiversity. Attributes of Black-tailed Prairie Dog Colonies in North Central Montana with Management Recommendations for the Conservation of Biodiversity. pgs 13-28.
- Reading, R., and Randy Matchet. 1997. Attributes of Black-tailed Prairie Dog Colonies in Northcentral Montana. Journal of Wildlife Management 61(3): 664-673.
- Robinson, S. K. 1992. *Population dynamics of breeding birds in a fragmented Illinois landscape*. Pages 408-418 in J. Hagan and D. W. Johnston, editors. *Ecology and conservation of neotropical migrant land birds*. Smithsonian Institution press, Washington, D. C.
- Romin, Laura A., and Muck, James A. May 1999. Utah Field Office Guidelines For Raptor Protection From Human And Land Use Disturbances. U.S. Fish and Wildlife Service, Salt Lake City, Utah
- Rotenberry J. T., and J. A. Wiens. 1980a. Habitat structure, patchiness, and avian communities in North American steppe vegetation: a multivariate analysis. *Ecology*. 61:1228-1250.
- Rowland, M. M., M. Leu, , S. P. Finn, S. Hanser, L. H. Suring, J. M. Boyd, C. W. Meinke, S. T. Knick, and M. J. Wisdom. 2005. Assessment of threats to sagebrush habitats and associated species of concern in the Wyoming Basins. Version 1.1, June 2005, unpublished report on file at USGS Biological Resources Discipline, Snake River Field Station, 970 Lusk St., Boise, ID 83706.
- Rowland, M. M., M. Leu, , S. P. Finn, S. Hanser, L. H. Suring, J. M. Boyd, C. W. Meinke, S. T. Knick, and M. J. Wisdom. 2005. Assessment of threats to sagebrush habitats and associated species of concern in the Wyoming Basins. Version 1.1, June 2005, unpublished report on file at USGS Biological Resources Discipline, Snake River Field Station, 970 Lusk St., Boise, ID 83706.
- Ruggiero, L.F., K.B. Aubry, S.W. Buskirk, G.M. Koehler, C.J. Krebs, K.S. McKelvey, and J.R. Squires. 1999. The Scientific Basis for Lynx Conservation: Qualified Insights. Ch16. USDA Forest Service Technical Report RMRS-GTR-30.
- Saab, V., and T. Rich. 1997. *Large-scale conservation assessment for neotropical migratory landbirds in the Interior Columbia River Basin*. USDA Forest Service General Technical Report PNW-GTR-399, Portland, Oregon, USA.
- Smith D.G., and J.R. Murphy. 1978. Biology of ferruginous hawk in central Utah. *Sociobiology* 3:79-95.
- State wildlife agencies' ad hoc committee for sage-grouse and oil and gas development. 2008. Using the best available science to coordinate conservation actions that benefit greater sage-grouse across states affected by oil and gas development in Management Zones I-II (Colorado, Montana, North Dakota, South Dakota, Utah and Wyoming). Unpublished report. Colorado Division of Wildlife, Denver; Montana Fish, Wildlife and Parks, Helena; North Dakota Game and Fish Department, Bismarck; Utah Division of Wildlife Resources, Salt Lake City; Wyoming Game and Fish Department, Cheyenne.
- Steenhof K., M. N. Kochert, and J. A. Roppe. 1993. Nesting by raptors and Common Ravens on electrical transmission line towers. *Journal of Wildlife Management*. 57:272-281.
- Stinson, D. W., D. W. Hays, and M. A. Schroeder. 2004. Washington State Recovery Plan for the Sage-grouse. Washington Department of Fish and Wildlife, Olympia, Washington. 109 pages.
- Taylor, R. L., D. E. Naugle, L. S. Mills. 2012. Viability analyses for conservation of sage-grouse populations: Buffalo Field Office, Wyoming. Final Report. February 27, 2012. University of Montana, Missoula, MT.

- Temple S. A. 1986. Predicting impacts of habitat fragmentation on forest birds: A comparison of two models. Pages 301-304 in Wildlife 2000 (J. Verner, C. J. Ralph, and M. L. Morrison, Eds.). Univ. Wisconsin Press, Madison.
- Temple S.A., and J. R. Cary. 1988. Modeling dynamics of habitat-interior bird populations in fragmented landscapes Conserv. Biol.2 :340-347.
- Temple, S.A., and B.A. Wilcox. 1986. Introduction: Predicting effects of habitat patchiness and fragmentation. In *Wildlife 2000: Modeling Habitat Relationships of Terrestrial Vertebrates*, ed. J. Verner, M.L. Morrison, and C.J. Ralph, 261-62. Madison: University of Wisconsin Press.
- The National Environmental Policy Act of 1969 (NEPA), as amended (Pub. L. 91-90, 42 U.S.C. 4321 et seq.).
- Urban, D. L., and H. H. Shugart, Jr. 1984. Avian demography in mosaic landscapes: modeling paradigm and preliminary results. Pages 273-280 in J. Verner, M. L. Morrison, and C. J. Ralph editors. Wildlife 2000: Modeling habitat relationships of terrestrial vertebrates. University of Wisconsin Press, Madison.
- U.S. Department of the Interior, Bureau of Land Management and Office of the Solicitor (editors). 2001. The Federal Land Policy and Management Act, as amended. Public Law 94-579.
- U.S. Department of the Interior 2009, Bureau of Land Management, Instruction Memorandum 2009-078. Processing Oil and Gas Applications for Permit to Drill for Directional Drilling into Federal Mineral Estate from Multiple-Well Pads on Non-Federal Surface and Mineral Estate Locations.
- U.S. Department of the Interior 1985, Bureau of Land Management, Buffalo Field Office. Buffalo Resource Management Plan Final Environmental Impact Statement, Record of Decision; see also Approved Resource Management Plan for Public Lands Administered by the Bureau of Land Management Buffalo Field Office 2001; and see: Powder River Oil and Gas Project Environmental Impact Statement and Resource Management Plan Amendment. 2003.
- U.S. Department of the Interior 2011, Bureau of Land Management, Casper Field Office, Environmental Assessment of Samson Resources Company's Proposed Field Development Program in and adjacent to the Hornbuckle Field, Converse County, Wyoming, WY-060-EA11-181.
- U.S. Department of the Interior 2011, Bureau of Land Management. State Director Review, SDR WY-2011-010.
- U.S. Department of the Interior 2007, US Fish and Wildlife Service. Reinitiation of Formal Consultation for Powder River Oil and Gas Project. March 23, 2007
- U.S. Department of the Interior, Fish and Wildlife Service. 2002. Final Biological and Conference Opinion for the Powder River Oil and Gas Project, Campbell, Converse, Johnson, and Sheridan Counties (WY6633). December 17, 2002. Cheyenne, WY. 58pp.
- U.S. Department of the Interior, Fish and Wildlife Service. *Report Mountain Plover (Charadrius Montanus) Biological Evaluation*. March 9, 2007.
- U.S. Department of the Interior, Fish and Wildlife Service. 2010. Endangered and Threatened Wildlife and Plants; 12-Month Findings for Petitions to List the Greater Sage-Grouse (*Centrocercus urophasianus*) as Threatened or Endangered. 50 CFR Part 17.
- U.S. Department of the Interior, Fish and Wildlife Service. 1989. Black-footed ferret Survey Guidelines for Compliance with the Endangered Species Act. Denver, CO and Albuquerque, NM.
- U.S. Department of the Interior, Geological Service. 1996. Occurrences of Erionite in Sedimentary Rocks of the Western United States, R.A. Shepherd, Report 96-018.

- U.S. Department of the Interior, Geological Service. 2007. Organic Compounds in Produced Waters from Coalbed Natural Gas Wells in the Powder River Basin, Wyoming. Applied Geochemistry 22, 2240–2256.
- U.S. Department of the Interior, Geological Service. 2010. Assessment of Potential Effects of Water Produced from Coalbed Methane Natural Gas Development on Macroinvertebrate and Algal Communities in the Powder River and Tongue River, Wyoming and Montana.
- U.S. Environmental Protection Agency. 2004. Evaluation of Impacts to Underground Sources of Drinking Water by Hydraulic Fracturing of Coalbed Methane Reservoirs Study, EPA 816-R-04-003, <http://water.epa.gov/type/groundwater/uic/upload/completetestudy.zip>.
- Vander Haegen, W. M., F. C. Dobler, and D. J. Pierce. 2000. Shrubsteppe bird response to habitat and landscape variables in eastern Washington, USA. Conservation Biology 14:1145-1160.
- Walker, B.L., D. E. Naugle, and K.E. Doherty. 2007. Greater sage-grouse population response to energy development and habitat loss. Journal of Wildlife Management 71:2644-2654.
- Walker, B. L., and D. E. Naugle. 2011. West Nile virus ecology in sagebrush habitats and impacts on greater sage-grouse populations. Pages 127-142 in Greater sage-grouse: ecology and conservation of a landscape species and its habitats, S. T. Knick, J. W. Connelly, C. E. Braun (eds). Studies in Avian Biology, Number 38, University of California Press, Berkeley.
- Walker, B. L., D. E. Naugle, K. E. Doherty, and T. E. Cornish. 2007. West Nile virus and greater sage-grouse; estimating infection rate in a wild bird population. Avian Diseases 51:691-696.
- Walker B, Naugle D, Rinkes T. 2003. The Response of Sage Grouse to Coal-bed Methane Development and West Nile virus in the Powder River Basin: Is There a Link ? Page 6 in: Program and Abstracts for the Annual Wildlife Society Meeting, Wyoming Chapter.
- Walker, B.L., D. E. Naugle, and K.E. Doherty. 2007. Greater sage-grouse population response to energy development and habitat loss. Journal of Wildlife Management 71:2644-2654.
- WDEQ, June 14, 2004. Compliance Monitoring for Ground Water Protection Beneath Unlined Coalbed Methane Produced Water Impoundments
- Windingstad, R. M., F. X. Kartch, R. K. Stroud, and M. R. Smith. 1987. Salt toxicosis in waterfowl in North Dakota. Jour. Wildlife Diseases 23(3):443-446.
- Wyoming Game and Fish Department (WGFD). 2004. Minimum Recommendations for Development of Oil and Gas Resources within Crucial and Important Wildlife Habitats on BLM Lands. WGFD. Cheyenne, WY
- WGFD. 2003. Wyoming Greater Sage-Grouse Conservation Plan. WGFD. Cheyenne, WY
- WGFD. 2004. Sheridan Region Wyoming Game and Fish Department: Annual Sage-Grouse Completion Report for 2004. Wyoming Game and Fish Department. Gillette, WY.
- WGFD. 2005. Northeast Wyoming Local Working Group Area: Annual Sage-Grouse Completion Report for 2005. Wyoming Game and Fish Department. Buffalo, WY. 42 pp.
- WGFD. 2008. Hunting and Sage-Grouse: A Technical Review of Harvest Management On a Species of Concern in Wyoming. Wyoming Game and Fish Department. Green River, WY. 21pp.
- WGFD. 2009. Minimum Recommendations for Development of Oil and Gas Resources within Crucial and Important Wildlife Habitats on BLM Lands. WGFD. Cheyenne, WY.



- White, C.M. and T.L. Thurow. 1985. Reproduction of Ferruginous Hawks exposed to controlled disturbance. *Condor*. 87:14-22.
- Zou, L., S. N. Miller, and E. T. Schmidtman. 2006. Mosquito larval habitat mapping using remote sensing and GIS: implications of coalbed methane development and West Nile virus. *Journal of Medical Entomology* 43:1034-1041.

**Appendix A. Table A.1. Summary of Sensitive Species Habitat and Project Effects Associated with Alternative B.**

Common Name (scientific name)	Habitat	Presence	Project Effects	Rationale
<b>Amphibians</b>				
Northern leopard frog ( <i>Rana pipiens</i> )	Beaver ponds and cattail marshes from plains to montane zones.	S	MIIH	Water levels in ponds may be altered.
Columbia spotted frog ( <i>Rana pretiosa</i> )	Ponds, sloughs, small streams, and cattails in foothills and montane zones. Confined to headwaters of the S Tongue R drainage and tributaries.	NP	NI	The project area is outside the species' range, and the species is not expected to occur.
<b>Fish</b>				
Yellowstone cutthroat trout ( <i>Oncorhynchus clarki bouvieri</i> )	Cold-water rivers, creeks, beaver ponds, and large lakes in the Upper Tongue sub-watershed	NP	NI	The project area is outside the species' range, and the species is not expected to occur.
<b>Birds</b>				
Baird's sparrow ( <i>Ammodramus bairdii</i> )	Shortgrass prairie and basin-prairie shrubland habitats; plowed and stubble fields; grazed pastures; dry lakebeds; and other sparse, bare, dry ground.	S	NI	Species hasn't been reported in the Buffalo Field Office.
Bald eagle ( <i>Haliaeetus leucocephalus</i> )	Mature forest cover often within one mile of large water body with reliable prey source nearby.	K	MIIH	Bald eagles are not likely to use the few mature trees in the project area for nesting or winter roosting. Surface disturbing and maintenance activities may impact foraging eagles and the species may avoid the area.
Brewer's sparrow ( <i>Spizella breweri</i> )	Sagebrush shrubland	S	MIIH	Nesting and foraging habitat may be impacted by dust, noise, human activities, and direct loss. Species may avoid area.
Ferruginous hawk ( <i>Buteo regalis</i> )	Basin-prairie shrub, grasslands, rock outcrops	K	MIIH	Nests documented in the project area. Nesting and foraging habitat will be impacted by dust, noise, human activities, and direct loss. Species may avoid area.
Loggerhead shrike ( <i>Lanius ludovicianus</i> )	Basin-prairie shrub, mountain-foothill shrub	S	MIIH	Nesting and foraging habitat may be impacted by dust, noise, human activities, and direct loss. Species may avoid area.

Common Name (scientific name)	Habitat	Presence	Project Effects	Rationale
Long-billed curlew ( <i>Numenius americanus</i> )	Grasslands, plains, foothills, wet meadows	S	MIIH	Nesting and foraging habitat may be impacted by dust, noise, human activities, and direct loss. Species may avoid area.
Mountain Plover	Short-grass prairie with slopes < 5%	NS	NI	Habitat is limited.
Northern goshawk ( <i>Accipiter gentilis</i> )	Conifer and deciduous forests	NP	NI	Habitat not present.
Peregrine falcon ( <i>Falco peregrinus</i> )	Cliffs	NP	NI	Habitat not present.
Sage sparrow ( <i>Amphispiza billneata</i> )	Basin-prairie shrub, mountain-foothill shrub	NS	NI	Sage sparrows have not been observed in the area.
Sage thrasher ( <i>Oreoscoptes montanus</i> )	Basin-prairie shrub, mountain-foothill shrub	NS	MIIH	Nesting and foraging habitat may be impacted by dust, noise, human activities, and direct loss. Species may avoid area.
Trumpeter swan ( <i>Cygnus buccinator</i> )	Lakes, ponds, rivers	NP	NI	Habitat not present.
Western Burrowing owl ( <i>Athene cunicularia</i> )	Grasslands, basin-prairie shrub	S	MIIH	Nesting and foraging habitat may be impacted by dust, noise, human activities, and direct loss. Species may avoid area.
White-faced ibis ( <i>Plegadis chihi</i> )	Marshes, wet meadows	NP	NI	Habitat not present.
Yellow-billed cuckoo ( <i>Coccyzus americanus</i> )	Open woodlands, streamside willow and alder groves	NP	NI	Habitat not present.
<b>Mammals</b>				
Black-tailed prairie dog ( <i>Cynomys ludovicianus</i> )	Prairie habitats with deep, firm soils and slopes less than 10 degrees.	NS	NI	No colonies documented in the project area.
Fringed myotis ( <i>Myotis thysanodes</i> )	Conifer forests, woodland chaparral, caves and mines	NP	NI	Habitat not present.
Long-eared myotis ( <i>Myotis evotis</i> )	Conifer and deciduous forest, caves and mines	NP	NI	Habitat not present.
Swift fox ( <i>Vulpes velox</i> )	Grasslands	S	MIIH	Suitable habitat is present.
Townsend's big-eared bat ( <i>Corynorhinus townsendii</i> )	Caves and mines.	NP	NI	Habitat not present.

Common Name (scientific name)	Habitat	Presence	Project Effects	Rationale
<b>Plants</b>				
Limber Pine ( <i>Pinus flexilis</i> )	Mountains, associated with high elevation conifer species	NP	NI	Habitat not present.
Porter's sagebrush ( <i>Artemisia porteri</i> )	Sparsely vegetated badlands of ashy or tufaceous mudstone and clay slopes 5300-6500 ft.	NP	NI	Habitat not present.
William's wafer parsnip ( <i>Cymopterus williamsii</i> )	Open ridgetops and upper slopes with exposed limestone outcrops or rockslides, 6000-8300 ft.	NP	NI	Project area outside of species' range.
<b>Presence</b> <b>K</b> - Known, documented observation within project area. <b>S</b> - Habitat suitable and species suspected, to occur within the project area. <b>NS</b> - Habitat suitable but species is not suspected to occur within the project area. <b>NP</b> - Habitat not present and species unlikely to occur within the project area.		<b>Project Effects</b> <b>NI</b> - No Impact. <b>MIH</b> - May Impact Individuals or Habitat, but will not likely contribute to a trend towards Federal listing or a loss of viability to the population or species. <b>WIPV</b> - Will Impact Individuals or Habitat with a consequence that the action may contribute to a trend towards Federal listing or cause a loss of viability to the population or species. <b>BI</b> -Beneficial Impact		

**Table A.2. Raptor Nests in the Cottonwood Project Area**

BLM ID	UTMs	Legal	Substrate	Year	Condition	Status	Species
4422	427286E 4821727N	S8 T41N R75W	CTL	2011	Poor	INAC	n/a
				2010	Fair	INAC	n/a
				2009	Fair	ACTI	RETA
				2007	Excellent	ACTI	RETA
				2006	Good	ACTI	SWHA
4436	427208E 4821725N	S8 T41N R75W	CTL	2011	Nest Gone	INAC	n/a
				2010	Nest Gone	INAC	UNRA
				2009	Nest Gone	INAC	n/a
				2007	Good	ACTI	GRHO
4625	426096E 4827495N	S19 T42N R75W	GHS	2011	Poor	INAC	n/a
				2010	Poor	INAC	n/a
				2009	Fair	INAC	n/a
				2008	Fair	INAC	n/a
				2007	Excellent	ACTI	FEHA
				2006	Excellent	OCCU	FEHA
4626	426610E 4824765N	S31 T42N R75W	GHS	2011	Fair	INAC	n/a
				2010	Excellent	INAC	n/a
				2009	Good	INAC	n/a
				2008	Fair	INAC	n/a
				2007	Excellent	INAC	n/a
				2006	Excellent	OCCU	FEHA
4628	424350E 4824936N	S36 T42N R76W	CTL	2011	Substrate Gone	DNLO	n/a
				2010	Substrate Gone	INAC	n/a
				2009	Substrate Gone	DNLO	n/a
				2007	Excellent	INAC	n/a
				2006	Excellent	OCCU	GRHO
4633	425307E 4824056N	S31 T42N R75W	GHS	2011	Poor	INAC	n/a
				2010	Poor	INAC	n/a
				2009	Poor	INAC	n/a
				2008	Remnants	INAC	n/a
				2007	Poor	INAC	n/a
				2006	Poor	INAC	n/a

BLM ID	UTMs	Legal	Substrate	Year	Condition	Status	Species
4634	424708E 4824190N	S36 T42N R76W	GHS	2011	Poor	INAC	n/a
				2010	Poor	INAC	n/a
				2009	Good	INAC	n/a
				2008	Remnants	INAC	n/a
				2007	Poor	INAC	n/a
				2006	Poor	INAC	n/a
4635	424254E 4826152N	S25 T42N R76W	GHS	2011	Nest Gone	INAC	n/a
				2010	Poor	INAC	n/a
				2009	Poor	INAC	n/a
				2008	Poor	INAC	n/a
				2007	Poor	INAC	n/a
				2006	Poor	INAC	n/a
4636	424402E 4826285N	S25 T42N R76W	GHS	2011	Poor	INAC	n/a
				2010	Poor	INAC	n/a
				2009	Poor	INAC	n/a
				2008	Remnants	INAC	n/a
				2007	Poor	INAC	n/a
				2006	Poor	INAC	n/a
4637	424894E 4827233N	S24 T42N R76W	GHS	2011	Poor	INAC	n/a
				2010	Poor	INAC	n/a
				2010	Remnants	INAC	n/a
				2009	Poor	INAC	n/a
				2008	Poor	INAC	n/a
				2007	Poor	INAC	n/a
				2006	Poor	INAC	n/a
4638	424895E 4827409N	S24 T42N R76W	GHS	2011	Poor	INAC	n/a
				2010	Poor	INAC	n/a
				2009	Poor	INAC	n/a
				2008	Remnants	INAC	n/a
				2007	Poor	INAC	n/a
				2006	Poor	INAC	n/a

BLM ID	UTMs	Legal	Substrate	Year	Condition	Status	Species
4639	426595E 4824775N	S31 T42N R75W	GHS	2011	Nest Gone	INAC	n/a
				2010	Nest Gone	INAC	n/a
				2009	Nest Gone	INAC	n/a
				2008	Nest Gone	INAC	n/a
				2007	Remnants	INAC	n/a
				2006	Remnants	INAC	n/a
4640	426555E 4824800N	S31 T42N R75W	GHS	2011	Poor	INAC	n/a
				2010	Fair	INAC	n/a
				2009	Poor	INAC	n/a
				2008	Fair	INAC	n/a
				2007	Fair	INAC	n/a
				2006	Fair	INAC	n/a
4641	426440E 4824985N	S31 T42N R75W	GHS	2011	Poor	INAC	n/a
				2010	Poor	INAC	n/a
				2009	Poor	INAC	n/a
				2008	Poor	INAC	n/a
				2007	Fair	INAC	n/a
				2006	Fair	INAC	n/a
4646	426148E 4828087N	S19 T42N R75W	GHS	2011	Fair	INAC	n/a
				2010	Fair	INAC	n/a
				2009	Fair	INAC	n/a
				2008	Poor	INAC	n/a
				2007	Fair	OCCU	FEHA
				2006	Fair	INAC	n/a
4683	425993E 4827478N	S19 T42N R75W	GHS	2011	Poor	INAC	n/a
				2010	Poor	INAC	n/a
				2009	Poor	INAC	n/a
				2008	Good	INAC	n/a
				2007	Good	ACTI	FEHA
4689	426174E 4828302N	S19 T42N R75W	GHS	2011	Poor	INAC	n/a
				2010	Poor	INAC	n/a
				2009	Fair	INAC	n/a
				2008	Fair	INAC	n/a
				2007	Fair	INAC	n/a

BLM ID	UTMs	Legal	Substrate	Year	Condition	Status	Species
6142	424823E 4824925N	S36 T42N R76W	CTL	2011	Fair	INAC	n/a
				2010	Fair	INAC	n/a
				2009	Fair	INAC	n/a
10420	423979E 4825482N	S25 T42N R76W	CTL	2011	Good	INAC	n/a
				2010	Good	INAC	UNRA
				2009	Good	INAC	n/a
11227	427102E 4821649N	S8 T41N R75W	CTL	2011	Good	ACTI	RETA
				2010	Good	ACTI	RETA
12682	426026E 4825506N	S30 T42N R75W	CTL	2011	Good	ACTI	AMKE

**Notes:** CTL = Cottonwood (live); GHS = Ground/Hillside;

ACTI = Active; DNLO = Did not locate; INAC = Inactive; OCC = Occupied; UNK = Unknown.

AMKE = American Kestrel; FEHA = Ferruginous Hawk; GRHO = Great-horned Owl; RETA = Red-tailed Hawk; SWHA = Swainson's Hawk; UNRA = Unknown



## APPENDIX B:

### **CONDITIONS OF APPROVAL FOR CONVENTIONAL APPLICATION FOR PERMIT TO DRILL**

**Cottonwood 1 POD, supported by Environmental Assessment (EA), WY-070-EA12-102**

Operator: Devon Energy Production Company, L.P.

Field Office: Buffalo Field Office  
Address: 1425 Fort Street  
Buffalo, Wyoming 82834

Office Telephone Number: 307-684-1100

The spud date will be reported electronically, (see website location above) to the Authorized Officer **24 HOURS BEFORE SPUDDING**, unless otherwise required in site specific conditions of approval.

Spud Notice Site:

[http://www.wy.blm.gov/minerals/og/og\\_notices/spud\\_notice.php](http://www.wy.blm.gov/minerals/og/og_notices/spud_notice.php)

List of Wells and Fresh Water Pits:

#	Well Name #	Qtr/Qtr	Sec.	TWP	RNG	Lease #	Status
1	Cottonwood 515-1SH	SESE	6	41N	75W	WYW0314361	APD
2	Cottonwood 615-4SH	SESE	6	41N	75W	WYW0314361	APD
3	Cottonwood 815-2SH	NENW	17	41N	75W	WYW0314361, WYW0275169	APD
4	Cottonwood 1715-3SH	NENW	17	41N	75W	WYW0314361, WYW0275169	APD
5	Cottonwood 1925-2SH	SWSW	19	42N	75W	WYW0311966	APD
6	Cottonwood 3025-1SH	SWSW	19	42N	75W	WYW0311966	APD
7	Cottonwood 3125-3SH	NWNE	31	42N	75W	WYW0311966	APD
8	North Cottonwood 1 POD Fresh Water Supply Pit	SESE	25	42N	76W	NA	
9	South Cottonwood 1 POD Fresh Water Supply Pit	NWSW	8	41N	75W	NA	

### **SITE SPECIFIC**

#### **Surface:**

1. All proposed pads will be slope staked prior to construction.
2. Before construction or drilling will occur a pre-construct meeting will be required, please contact Andy Perez– Natural Resource Specialist, at (307) 684-1166 to schedule. The operator is responsible for having all contractors present (dirt contractors, drilling contractor, pipeline contractor, project oversight personnel, etc.) including the overall field operations superintendent, and for providing all contractors copies of the approved APD package, project map and BLM Conditions of Approval pertinent to the work that each will be doing.

3. Improved roads used in conjunction with accessing Cottonwood 1POD wells must be fully built (including all water control structures such as wingditches, culverts, relief ditches, low water crossings, surfacing, etc.) and functional to BLM standards as outlined in the BLM Manual 9113 prior to drilling of the well. This applies to the entire Cottonwood1 project area.
4. All permanent above-ground structures (e.g., production equipment, tanks, etc.) not subject to safety requirements will be painted to blend with the natural color of the landscape. The paint used will be a color which simulates "Standard Environmental Colors." The color selected for the project area is Covert Green, 18-0617 TPX.
5. Erosion control fabric used for reclamation of steep slopes will be photodegradable or biodegradable to limit the amount of debris/trash on and around location. All erosion control products will be applied according to manufacturer's specifications to reduce product failures.
6. Before replacing topsoil on heavily disturbed surfaces, and on all other compacted surfaces compaction will be remediated by subsoiling, paraplowing, or ripping with a winged shank to the depth of compaction. Scarification will only be used on shallow soils.
7. To ensure proper water movement over the top of the erosion control fabric, the fabric will be 'keyed' into the slope by digging a small trench at the top of the slope. Lay the top end of the material into the trench to line it. To line it the edge is folded underneath itself and then it is secured using staples. The trench is then filled in to the previous soil level. Fabric should be overlapped on edges and stapled according to manufacturers' specifications.
8. BLM approved fluids and drilling mud must be buried within the reserve pit. Subsoil must then be replaced in the reserve pit before topsoiling. Under no circumstances would any by-products from drilling or subsoil to be spread on top of topsoil.

#### **Water:**

1. The operator will collect a water sample representative of the water produced from this (these) wells for analysis within 30 to 60 days of initial production. Results of the analysis will be submitted to the BLM Authorized Officer as soon as they become available. The constituents analyzed in the water quality analyses will be the same as those required by the WDEQ for WYPDES permit using approved EPA test procedures (40CFR136 or 40CRF136.5).
2. After well completion, the operator shall submit a Sundry Notice for approval of disposal of all produced water in accordance with Onshore Oil and Gas Order No. 7, Disposal of Produced Water.

#### **Wildlife:**

##### **Sage-grouse**

1. No surface disturbing activities are permitted during sage-grouse breeding and nesting periods (March 15-June 30), for the Cottonwood 1925-2SH/3025-1SH wells and all associated infrastructure.
2. A sage-grouse survey will be conducted by a biologist following the most current WGFD protocol. All survey results shall be submitted in writing to a Buffalo BLM biologist no later than July 31 of the current year. This condition will be implemented on an annual basis for each year of surface disturbing activities.
  - a. If a previously unknown lek is identified during surveys (April 1-May 7), a Buffalo BLM biologist shall be notified.

### **Raptors**

1. No surface disturbing activity shall occur within 0.5 mile of all raptor nests from February 1 through July 31, annually, prior to a raptor nest occupancy survey. This timing limitation will affect the Cottonwood 1925-2SH/3025-1SH, 3125-3SH, and 615-4SH//515-1SH wells and their associated infrastructure.
2. Surveys to document nest occupancy shall be conducted by a biologist following BLM protocol, between April 15 and June 30. All survey results shall be submitted in writing to a Buffalo BLM biologist and approved prior to surface disturbing activities. Surveys outside this window may not depict nesting activity. If a survey identifies active raptor nests, a ½ mile timing restriction on surface disturbance from February 1 to July 31 will be implemented.
3. If an undocumented raptor nest is located during project construction or operation, the Buffalo Field Office (307-684-1100) shall be notified within 24 hours.

### **Migratory Birds**

1. Migratory birds shall be effectively excluded from all facilities that pose a mortality risk, including, but not limited to, heater treaters, flare stacks, and secondary containment where escape may be difficult or wildlife toxicants are present.

### **Cultural:**

All surface disturbing activity in the following areas will be monitored by a BLM cultural resource use permit (CRUP) holder or permitted crew chief. The Bureau has identified these areas as having a high potential for buried cultural deposits (areas containing alluvial deposits along Ninemile Creek). Some portions of the monitoring areas as described may lie outside alluvial deposits and exact monitoring areas are left to the discretion of the archeological monitor. All monitored areas must be plotted on the map provided with the monitoring report. The submission of two copies of a monitoring report to BFO is required within 30 days of the completion of all monitoring work:

1. Monitor all surface disturbing activity associated with the construction of the Cottonwood 615-4SH & 515-1SH well pad and the associated access road located in T41N R75W Sections 5, 6, 7, and 8.

## **STANDARD**

### **General**

1. For any surface-disturbing activities proposed in sagebrush shrublands, the operator will conduct clearance surveys for sage-grouse breeding activity during the sage-grouse's breeding season before initiating the activities. The surveys must encompass all sagebrush shrublands within 0.5 miles of the proposed activities.
  - a. This will apply to all approved wells and infrastructure. All survey results shall be submitted in writing to a Buffalo BLM biologist no later than July 31 of the current year. This condition will be implemented on an annual basis for the duration of surface disturbing activities. If a previously unknown lek is identified during surveys (April 1-May 7), a Buffalo BLM biologist shall be notified.
2. If any cultural values [sites, artifacts, human remains (Appendix L FEIS and ROD)] are observed during operation of this lease/permit/right-of-way, they will be left intact and the Buffalo Field Manager notified. The authorized officer will conduct an evaluation of the cultural values to establish appropriate mitigation, salvage or treatment. The operator is responsible for informing all persons in the area who are associated with this project that they will be subject to prosecution for knowingly disturbing historic or archaeological sites, or for collecting artifacts. If historic or archaeological

materials are uncovered during construction, the operator is to immediately stop work that might further disturb such materials, and contact the authorized BLM officer (AO). Within five working days the AO will inform the operator as to:

- whether the materials appear eligible for the National Register of Historic Places;
  - the mitigation measures the operator will likely have to undertake before the site can be used (assuming in situ preservation is not necessary); and,
  - a time-frame for the AO to complete an expedited review under 36 CFR 800.11 to confirm, through the State Historic Preservation Officer, that the findings of the AO are correct and that mitigation is appropriate. The AO will provide technical and procedural guidelines for the conduct of mitigation. Upon verification from the AO that the required mitigation has been completed, the operator will then be allowed to resume construction measures.
- b. If paleontological resources, either large or conspicuous, and/or a significant scientific value are discovered during construction, the find will be reported to the Authorized Officer immediately. Construction will be suspended within 250 feet of said find. An evaluation of the paleontological discovery will be made by a BLM approved professional paleontologist within five (5) working days, weather permitting, to determine the appropriate action(s) to prevent the potential loss of any significant paleontological values. Operations within 250 feet of such a discovery will not be resumed until written authorization to proceed is issued by the Authorized Officer. The applicant will bear the cost of any required paleontological appraisals, surface collection of fossils, or salvage of any large conspicuous fossils of significant scientific interest discovered during the operation.
- c. Please contact Andy Perez, Natural Resource Specialist, at (307) 684-1166, Bureau of Land Management, Buffalo, if there are any questions concerning the following surface use COAs.

## **DRILLING AND PRODUCTION OPERATIONS**

1. **Verbal notification shall be given to the Authorized Officer at least 24 hours before formation tests, BOP tests, running and cementing casing, and drilling over lease expiration dates.**
2. New hard-band drill pipe shall not be rotated inside any casing. Hard-band drill pipe shall be considered new until it has been run at least once.
3. All Blow Out Prevention Equipment tests shall include a 5 minute low pressure test between 250 psi and 500 psi with no drop in pressure with the only exception being the chokes. The chokes are only required to have the high pressure test held for a minimum length of time necessary to verify their functional integrity.
4. All operations must be conducted in accordance with all applicable laws and regulations: with the lease terms, Onshore Oil and Gas Orders, NTL's; and with other orders and instructions of the Authorized Officer, unless a variance has been granted in writing by the Authorized Officer.
5. The Operator shall install an identification sign consistent with the requirements of 43 CFR 3162.6 immediately upon or before the completion of the well pad construction operations.
6. All Blow Out Prevention Equipment rated 5M or greater shall be isolated from the casing and tested to stack working pressure. All Blow Out Prevention Equipment tests shall be performed by a suitable test pump, not the rig-mud pumps and recorded on a chart. The chart shall be submitted to the Buffalo Field Office.

7. Low test on Blow Out Prevention Equipment shall be performed and passed before moving onto the high test for each component.
8. If there are indications of inadequate primary cementing of the surface, intermediate, or production casing strings; such as but not limited to no returns to surface, cement channeling, fallback or mechanical failure of equipment, the operator will evaluate the adequacy of the cementing operations. This evaluation will consist of running a cement bond log (CBL) or an alternate method approved by the Authorized Officer (AO) no sooner than 12 hours and no later than 24 hours from the time the cement was first pumped.
9. If the evaluation indicates inadequate cementing, the operator shall contact a BLM Buffalo Field Office Petroleum Engineer for approval of remedial cementing work.
10. The adequacy of the remedial cementing operations shall be verified by a cement bond log (CBL) or an alternate method approved by the Authorized Officer (AO). All remedial work shall be completed and verified prior to drilling out the casing shoe or perforating the casing for purposes other than remedial cementing.
11. The cement mix water used must be of adequate quality so as not to degrade the setting properties of the cement. Any water that does not meet municipal quality water standards shall be tested by mixing the water and cement in a lab and comparing the results to the municipal quality water mix results. If the results show that the cement qualities are not the same or greater, then the non-municipal water shall not be used for mixing cement in the well.
12. All oil and gas operations shall be conducted in a manner to prevent the pollution of all freshwater resources. All fresh waters and waters of present or probable future value for domestic, municipal, commercial, stock or agricultural purposes will be confined to their respective strata and shall be adequately protected. Special precautions will be taken to guard against any loss of artesian water from the strata in which it occurs and the contamination of fresh water by objectionable water, oil, condensate, gas or other deleterious substance to such fresh water.
13. Any changes to the approved drilling plan and/or these conditions of approval shall be approved by the BLM-Buffalo Field Office Petroleum Engineer prior to being implemented. After hour's number:  
Petroleum Engineer: Matthew Warren Cell Telephone: 307-620-0103

### **Construction**

1. Construction and drilling activity will not be conducted using frozen or saturated soil material during periods when watershed damage or excessive rutting is likely to occur.
2. Remove all available topsoil (depths vary from 4 inches on ridges to 12+ inches in bottoms) from constructed well locations including areas of cut and fill, and stockpile at the site. Topsoil will also be salvaged for use in reclamation on all other areas of surface disturbance (roads, pipelines, etc.). Clearly segregate topsoil from excess spoil material. Any topsoil stockpiled for one year or longer will be signed and stabilized with annual ryegrass or other suitable cover crop.
3. The operator will not push soil material and overburden over side slopes or into drainages. All soil material disturbed will be placed in an area where it can be retrieved without creating additional undue surface disturbance and where it does not impede watershed and drainage flows.

4. Construct the backslope no steeper than ½:1, and construct the foreslope no steeper than 2:1, unless otherwise directed by the BLM Authorized Officer.
5. Maintain a minimum 20-foot undisturbed vegetative border between toe-of-fill of pad and/or pit areas and the edge of adjacent drainages, unless otherwise directed by the BLM Authorized Officer.
6. To minimize electrocution potential to birds of prey, all overhead electrical power lines on BLM surface will be constructed to standards identified by the Avian Power Line Interaction Committee (2006).
7. The reserve pit will be oriented to prevent collection of surface runoff. After the drilling rig is removed, the operator may need to construct a trench on the uphill side of the reserve pit to divert surface drainage around it. If constructed, the trench will be left intact until the pit is closed.
8. The reserve pit will be lined with an impermeable liner if permeable subsurface material is encountered. An impermeable liner is any liner having a permeability less than 10<sup>-7</sup> cm/sec. The liner will be installed so that it will not leak and will be chemically compatible with all substances that may be put in the pit. Liners made of any man-made synthetic material will be of sufficient strength and thickness to withstand normal installation and pit use. In gravelly or rocky soils, a suitable bedding material such as sand will be used prior to installing the liner.
9. The reserve pit will be constructed so that at least half of its total volume is in solid cut material (below natural ground level).
10. Culverts will be placed on channel bottoms on firm, uniform beds, which have been shaped to accept them, and aligned parallel to the channel to minimize erosion. Backfill will be thoroughly compacted.
11. The minimum diameter for culverts will be 18 inches. However, all culverts will be appropriately sized in accordance with standards in BLM Manual 9113.
12. Construction and other project-related traffic will be restricted to approved routes. Cross-country vehicle travel will not be allowed.
13. Maximum design speed on all operator constructed and maintained roads will not exceed 25 miles per hour.
14. Pipeline construction shall not block nor change the natural course of any drainage. Pipelines shall cross perpendicular to drainages. Pipelines shall not be run parallel in drainage bottoms. Suspended pipelines shall provide adequate clearance for maximum runoff.
15. Pipeline trenches shall be compacted during backfilling. Pipeline trenches shall be routinely inspected and maintained to ensure proper settling, stabilization, and reclamation.
16. During construction, emissions of particulate matter from well pad and road construction would be minimized by application of water or other non-saline dust suppressants with at least 50 percent control efficiency. Dust inhibitors (surfacing materials, non-saline dust suppressants, and water) will be used as necessary on unpaved roads that present a fugitive dust problem. The use of chemical dust suppressants on public surface will require prior approval from the BLM Authorized Officer.

17. Operators are required to obtain a National Pollution Discharge Elimination System (NPDES) Storm Water Permit from the Wyoming DEQ for any projects that disturb five or more acres (changing to one acre in March 2005). This general construction storm water permit must be obtained from WDEQ prior to any surface disturbing activities and can be obtained by following directions on the WDEQ website at <http://deq.state.wy.us>. Further information can be obtained by contacting Barb Sahl at (307) 777-7570.
18. The operator shall submit a Sundry Notice (Form 3160-5) to BLM for approval prior to construction of any new surface disturbing activities that are not specifically addressed in the approved APD or POD Surface Use Plan.

### **Operations/Maintenance**

1. Confine all equipment and vehicles to the access road(s), pad(s), and area(s) specified in the approved APD or POD.
2. All waste, other than human waste and drilling fluids, will be contained in a portable trash cage. This waste will be transported to a State approved waste disposal site immediately upon completion of drilling operations. No trash or empty barrels will be placed in the reserve pit or buried on location. All state and local laws and regulations pertaining to disposal of human and solid waste will be complied with.
3. Rat and mouse holes shall be filled and compacted from the bottom to the top immediately upon release of the drilling rig from the location.
4. The operator will be responsible for prevention and control of noxious weeds and weeds of concern on all areas of surface disturbance associated with this project (well locations, roads, water management facilities, etc.) Use of pesticides shall comply with the applicable Federal and State laws. Pesticides shall be used only in accordance with their registered uses and within limitations imposed by the Secretary of Interior. Prior to the use of pesticides on public land, the holder shall obtain from the BLM authorized officer written approval of a plan showing the type and quantity of material to be used, pest(s) to be controlled, method of application, location of storage and disposal of containers, and any other information deemed necessary by the authorized officer to such use.
5. All permanent above-ground structures ( e.g. , production equipment, tanks, etc.) not subject to safety requirements will be painted to blend with the natural color of the landscape. The paint used will be a color which simulates "Standard Environmental Colors." The color selected for the Cottonwood 1 POD is covert green.
6. Sewage shall be placed in a self-contained, chemically treated porta-potty on location.
7. The operator and their contractors shall ensure that all use, production, storage, transport and disposal of hazardous and extremely hazardous materials associated with the drilling, completion and production of this well will be in accordance with all applicable existing or hereafter promulgated federal, state and local government rules, regulations and guidelines. All project-related activities involving hazardous materials will be conducted in a manner to minimize potential environmental impacts. In accordance with OSHA requirements, a file will be maintained onsite containing current Material Safety Data Sheets (MSDS) for all chemicals, compounds and/or substances which are used in the course of construction, drilling, completion and production operations.

8. Produced fluids shall be put in test tanks on location during completion work. Produced water will be put in the reserve pit during completion work per Onshore Order #7.
9. The only fluids/waste materials which are authorized to go into the reserve pit are RCRA exempt exploration and production wastes. These include:
  - drilling muds & cuttings
  - rigwash
  - excess cement and certain completion & stimulation fluids defined by EPA as exemptIt does not include drilling rig waste, such as:
  - spent hydraulic fluids
  - used engine oil
  - used oil filter
  - empty cement, drilling mud, or other product sacks
  - empty paint, pipe dope, chemical or other product containers
  - excess chemicals or chemical rinsateAny evidence of non-exempt wastes being put into the reserve pit may result in the BLM Authorized Officer requiring specific testing and closure requirements.
10. Operators are advised that prior to installation of any oil and gas well production equipment which has the potential to emit air contaminants, the owner or operator of the equipment must notify the Wyoming Department of Environmental Quality, Air Quality Division (phone 307-777-7391) to determine permit requirements. Examples of pertinent well production equipment include fuel-fired equipment (e.g., diesel generators), separators, storage tanks, engines and dehydrators.

#### **DryHole/Reclamation**

1. All disturbed lands associated with this project, including the pipelines, access roads, water management facilities, etc will be expediently reclaimed and reseeded in accordance with the surface use plan and any pertinent site-specific COAs.
2. Disturbed lands will be recontoured back to conform with existing undisturbed topography. No depressions will be left that trap water or form ponds.
3. The fluids and mud must be dry in the reserve pit before recontouring pit area. The operator will be responsible for recontouring of any subsidence areas that develop from closing a pit before it is completely dry. The plastic pit liner (if any) will be cut off below grade and properly disposed of at a state authorized landfill before beginning to recontour the site.
4. Before the location has been reshaped and prior to redistributing the topsoil, the operator will rip or scarify the drilling platform and access road on the contour, to a depth of at least 12 inches. The rippers are to be no farther than 24 inches apart.
5. Distribute the topsoil evenly over the entire location and other disturbed areas. Prepare the seedbed by disking following the contour.
6. Waterbars are to be constructed at least one (1) foot deep, on the contour with approximately two (2) feet of drop per 100 feet of waterbar to ensure drainage, and extended into established vegetation. All waterbars are to be constructed with the berm on the downhill side to prevent the soft material from silting in the trench. The initial waterbar should be constructed at the top of the backslope. Subsequent waterbars should follow the following general spacing guidelines:



Slope (percent)	Spacing Interval (feet)
≤ 2	200
2 – 4	100
4 – 5	75
≥ 5	50

7. The operator will drill seed on the contour to an average depth of 0.5 inch, followed by cultipaction to compact the seedbed, preventing soil and seed losses. To maintain quality and purity, the current years tested, certified seed with a minimum germination rate of 80% and a minimum purity of 90% will be used. In lieu of a different specific mix desired by the surface owner, use the following:

<b>Loamy Ecological Site Seed Mix</b>		
<b>Species</b>	<b>% in Mix</b>	<b>Lbs PLS*</b>
<b><i>Western Wheatgrass</i></b> ( <i>Pascopyrum smithii</i> )/or <b><i>Thickspike Wheatgrass</i></b> ( <i>Elymus lanceolatus</i> ssp. <i>lanceolatus</i> )	30	3.6
<b><i>Bluebunch Wheatgrass</i></b> ( <i>Pseudoroegneria spicata</i> ssp. <i>Spicata</i> )	10	1.2
<b><i>Green needlegrass</i></b> ( <i>Nassella viridula</i> )	25	3.0
<b><i>Slender Wheatgrass</i></b> ( <i>Elymus trachycaulus</i> ssp. <i>trachycaulus</i> )	20	2.4
<b><i>Prairie coneflower</i></b> ( <i>Ratibida columnifera</i> )	5	0.6
<b><i>White or purple prairie clover</i></b> ( <i>Dalea candidum</i> , <i>purpureum</i> )	5	0.6
<b><i>Rocky Mountain beeplant</i></b> ( <i>Cleome serrulata</i> )	5	0.6
<b>Totals</b>	<b>100%</b>	<b>12 lbs/acre</b>

\*PLS = pure live seed

\*Northern Plains adapted species

\*Double this rate if broadcast seeding

\*PLS = pure live seed. Northern Plains adapted species. Slopes too steep for machinery may be hand broadcast and raked with twice the specified amount of seed. Complete fall seeding after September 15 and prior to prolonged ground frost. To be effective, complete spring seeding after the frost has left the ground and prior to May 15.

**This is a recommended seed mix based on the native plant species listed in the NRCS Ecological Site descriptions, U.W. College of Ag., and seed market availability. A site-specific inventory will allow the resource specialist to suggest the most appropriate species, percent composition, and seeding rate for reclamation purposes.**

8. BLM will not release the performance bond until the area has been successfully revegetated (evaluation will be made after the second complete growing season) and has met all other reclamation goals of the surface owner and surface management agency.
9. A Notice of Intent to Abandon and a Subsequent Report of Abandonment must be submitted for abandonment approval.

10. For performance bond release approval, a Final Abandonment Notice (with a surface owner release letter on split-estate) must be submitted prior to a final abandonment evaluation by BLM.
11. Soil fertility testing and the addition of soil amendments may be required to stabilize some disturbed lands.
12. Any mulch utilized for reclamation needs to be certified weed free.

### **Producing Well**

1. Landscape those areas not required for production to the surrounding topography as soon as possible. The fluids and mud must be dry in the reserve pit before recontouring pit area. The operator will be responsible for recontouring and reseeding of any subsidence areas that develop from closing a pit before it is completely dry.
2. Reduce the backslope to 2:1 and the foreslope to 3:1, unless otherwise directed by the BLM Authorized Officer. Reduce slopes by pulling fill material up from foreslope into the toe of cut slopes.
3. Production facilities (including dikes) must be placed on the cut portion of the location and a minimum of 15 feet from the toe of the back cut unless otherwise approved by the BLM Authorized Officer.
4. A dike will be constructed completely around the production facilities (i.e. production tanks, water tanks, and heater-treater). The dikes for the production facilities must be constructed of impermeable soil, hold 110% of the capacity of the largest tank plus 1-foot of freeboard, and be independent of the back cut.
5. Any chemicals used in treating the wells (e.g., corrosion inhibitor, emulsion breaker, etc.) will be in a secure, fenced-in area with appropriate secondary containment structure (dikes, catchment pan, etc.).
6. The load out line coming from the oil/condensate tank(s) will have a suitable containment structure to capture and recycle any oil spillage that might occur.
7. Individual production facilities (tanks, treaters, etc.) will be adequately fenced off (if entire facility not already fenced off).
8. Any spilled or leaked oil, produced water or treatment chemicals must be reported in accordance with NTL-3A and immediately cleaned up in accordance with BLM requirements. This includes clean-up and proper disposition of soils contaminated as a result of such spills/leaks.
9. Distribute stockpiled topsoil evenly over those areas not required for production and reseed as recommended.
10. Upgrade and maintain access roads and drainage control (e.g., culverts, drainage dips, ditching, crowning, surfacing, etc.) as necessary and as directed by the BLM Authorized Officer to prevent soil erosion and accommodate safe, environmentally-sound access.
11. Prior to construction of production facilities not specifically addressed in the APD/POD, the operator shall submit a Sundry Notice to the BLM Authorized Officer for approval.

12. If not already required prior to constructing and drilling the well location, the operator shall immediately upgrade the entire access road to BLM standards (including topsoiling, crowning, ditching, drainage culverts, surfacing, etc.) to ensure safe, environmentally-sound, year-round access.